UMTA-DC-06-0239-83-1
DOT-TSC-UMTA-82-58

U.S. Department
of Transportation
**Urban Mass
Transportation
Administration**

Accessible Bus Service in the Washington, DC, Metropolitan Area

Final Report
January 1983

UMTA/TSC Project Evaluation Series
Service and Management Demonstrations Program

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTA-DC-06-0239-83-1		

4. Title and Subtitle

ACCESSIBLE BUS SERVICE IN THE WASHINGTON, DC, METROPOLITAN AREA

5. Report Date
January 1983

6. Performing Organization Code
DTS-64

8. Performing Organization Report No.
DOT-TSC-UMTA-82-58

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10. Work Unit No. (TRAIS)
UM227/R3688

11. Contract or Grant No.
DOT-TSC-1412

12. Sponsoring Agency Name and Address
U.S. Department of Transportation
Urban Mass Transportation Administration
Office of Technical Assistance
Washington, DC 20590

13. Type of Report and Period Covered
Final Report
July 1979-August 1981

14. Sponsoring Agency Code
URT-30

15. Supplementary Notes

*under contract to: U.S. Department of Transportation
Research and Special Programs Administration
Transportation Systems Center
Cambridge MA 02142

16. Abstract

The Washington Metropolitan Area Transit Authority (WMATA) began operation of lift-equipped fixed-route service on several of its Metrobus routes in July 1979. Using 151 Flxible buses equipped with Vapor front-door lift devices, WMATA made 8% of its weekday (and a higher percentage of weekend) bus trips accessible to wheelchair and semi-ambulatory disabled.

The UMTA Service and Management Demonstrations Program provided grants to WMATA and George Washington University Rehabilitation Research and Training Center to develop and conduct driver and consumer training activities and to perform surveys and data collection to enable an evaluation of the project. This evaluation report describes the implementation and operation of the lift-equipped service and investigates issues related to equipment design, service quality, travel behavior and operator productivity.

Among the evaluation's key conclusions is that disabled individuals, like other potential passengers, are quite sensitive to service convenience and reliability, and that ridership will not develop if there are serious deficiencies in these characteristics. With only partially accessible Metrobus service scheduled and only 80% of scheduled service provided, lift ridership averaged only seven to eight boardings per day. The users, primarily young, male, affluent and mobile, were atypical of the disabled public. While these individuals indicated a preference for fixed-route service over door-to-door service, follow-up surveys showed few continuing riders. Despite favorable attitudes toward the fixed-route service concept, non-users cited barriers such as curbs as significant deterrents to their use of Metrobus. While ridership was too small to affect operator schedules, the maintenance and repair costs combined with low ridership made total per trip costs quite expensive, over $300 per trip. Although the lift equipment underwent modifications to overcome initial difficulties, lift damages and repairs remained a major problem.

17. Key Words	18. Distribution Statement
Elderly and Handicapped Transportation Accessible Bus Service Wheelchair Lifts Fixed-Route Accessibility	Document is Available through Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	336	

PREFACE

The Washington, D.C. Accessible Bus Project received funds from the U.S. Department of Transportation under the UMTA Service and Management Demonstrations Program. As part of that Program Multisystems under contract to the U.S. DOT's Transportation Systems Center has prepared this Final Evaluation Report.

This report is based on analysis of data collected by the Washington Metropolitan Area Transit Authority (WMATA) and George Washington University Rehabilitation Research and Training Center (RT-9). The authors wish to express particular thanks to the following individuals for their assistance to the project:

Betty Revis	Lift-Bus Project Coordinator, WMATA Office of Planning and Development
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Lynn Sahaj	Project Manager, UMTA, USDOT

The authors also wish to thank other GWU and WMATA staff who participated in data collection as well as the disabled individuals, bus operators and Metrobus passengers who completed surveys.

Finally, thanks to all the Multisystems staff members who contributed to the evaluation, in particular, Richard D. Juster and Abby K. Welling.

METRIC CONVERSION FACTORS

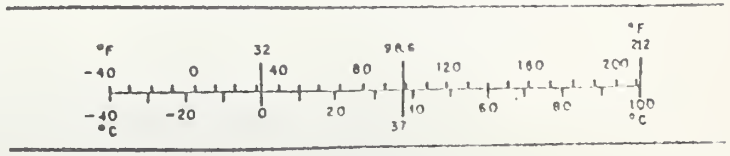
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures. Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTA-DC-06-0239-83-1	PB83-175778	

4. Title and Subtitle
Accessible Bus Service in the Washington, DC, Metropolitan Area.

5. Report Date
January 1983

6. Performing Organization Code
DTS-64

7. Author(s)
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DC-06-0239(UM227/R3688)

11. Contract or Grant No.
DOT-TSC-1412

12. Sponsoring Agency Name and Address
U.S. Department of Transportation
Urban Mass Transportation Administration
400 Seventh Street, S.W.
Washington, D. C. 20590

13. Type of Report and Period Covered
Final Report
July 1979 - August 1981

14. Sponsoring Agency Code
URT-30

15. Supplementary Notes *Under contract to: U.S. Department of Transportation, Research and Special Programs Administration, Transportation Center, Cambridge, MA 02142. Multisystems is the Consulting Division of Multiplications, Inc.

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The Washington Metropolitan Area Transit Authority (WMATA) began operation of lift-equipped fixed-route service on several of its Metrobus routes in July 1979. Using 151 Flxible buses equipped with Vapor front-door lift devices, WMATA made 8 percent of its weekday, and a higher percentage of weekend, bus trips accessible to wheelchair and semi-ambulatory disabled persons. The Urban Mass Transportation Administration's Service and Management Demonstration Program provided grants to WMATA and to George Washington's University Rehabilitation Research and Training Center to develop and conduct driver and consumer training activities and to perform surveys and data collection to enable an evaluation of the project.

This evaluation report describes the implementation and operation of lift-equipped service and investigates issues related to equipment design, service quality, travel behavior, and operator productivity. Among the evaluation's key conclusions is that disabled individuals, like other potential passengers, are quite sensitive to service convenience and reliability, and that ridership will not develop if there are aerious deficiencies in these characteristics. With only partially accessible Metrobus service schedules and only 80 percent of scheduled service provided, lift ridership averaged only seven to eight boardings per day. The users, primarily young, male, affluent, and mobile, were atypical of the disabled riders. While these individuals indicated a preference for fixed-route service over door-to-door service, follow-up surveys showed few continuing riders. Despite favorable attitudes toward the fixed-route service concept, non-users cited barriers such as curbs as significant deterrents to their use of Metrobus. While ridership was too low to affect operator schedules, the maintenance and repair costs combined with low ridership, made total per trip costs of over $300 per trip. Although the lift equipment underwent modifications to overcome initial difficulties, lift damages and repairs remained a major problem.

17. Key Words	18. Distribution Statement
Accessible Buses; Elderly Transportation; Fixed-Route Accessibility; Handicapped Transportation; Ridership; Washington, DC; Wheelchair Lifts	Available to the Public through the National Technical Information Service, Springfield, Virginia 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	336	A15

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

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EXECUTIVE SUMMARY

INTRODUCTION

The Washington Metropolitan Area Transit Authority (WMATA) introduced accessible fixed-route bus service on selected trips of several Metrobus routes in July 1979. With UMTA capital grant assistance, the authority obtained 131 new 40-foot Flxible buses equipped with Vapor front door lift devices and 20 similar 31-foot buses, making 8% of the fleet accessible. Using these vehicles, WMATA provided service to the disabled on 38 of 136 lines, at approximately hourly headways. The accessible service constituted about 8% of all week day Metrobus trips.

Together with the George Washington University Rehabilitation Research and Training Center (GWURTC), WMATA conducted special training and marketing programs, aimed at disabled individuals, the general riding public and bus drivers. UMTA Service and Methods Demonstration (SMD) Program funding supported training and marketing activities, as well as all data collection, through grants to both WMATA and GWURTC for $240,000 and $410,000 respectively. The Transportation System Center (TSC), which serves as the research branch of the U.S. DOT and routinely evaluates SMD demonstrations, conducted this evaluation of the accessible bus service project for UMTA, through its evaluation contractor, Multisystems, Inc.

While a number of similar services were concurrently implemented across the nation, the WMATA service has had some unique aspects, specifically, the scope of training activities undertaken.

PROJECT SETTING

The accessible bus project took place in a unique setting, as Washington is one of the few metropolitan areas to have a totally accessible rapid rail service. Thus, accessible transit coverage was more extensive than that provided by Metrobus alone. The Metrorail service continued to expand throughout the course of the demonstration and resulted in corresponding shifts in Metrobus routing. Also, the District of Columbia is one of the few areas in the country that have a shared-ride zone-fare taxi service and an open entry policy; the supply of taxi service is both plentiful and relatively inexpensive.

The Washington, D.C. area, with a metropolitan population of about 3 million, is also atypical in terms of employment and income characteristics: The government is the major employer and per capita income is among the highest in the country. The proportion of elderly in the Metropolitan area is considerably below the national average, while the area's handicapped population appears closer to the national level. The supply of specialized transportation services for the elderly and handicapped in terms of agencies and vehicles has approximately doubled over the past four years, although the growth in the number of passengers served annually has been much less dramatic.

PROJECT PLANNING, IMPLEMENTATION AND OPERATIONS

WMATA chose to implement fixed-route accessible service in response to federal "special efforts" requirements in effect in 1977, which permitted several alternative approaches to improving the mobility of the disabled. It was decided that half of an order of new buses would be equipped with front door lifts, with the remainder to be designed for possible retrofitting at a later date.

WMATA attempted to involve the disabled in the service planning and set up an Ad-Hoc Advisory Committee of Handicapped Individuals. WMATA also obtained several disabled volunteers to participate in a trial service on six routes beginning in April 1979 to obtain operating experience and iron out problems before offering advertised service to the disabled public. After accessible service was initiated, a permanent advisory committee was formed in October 1979 to review service progress and assist section 504 transition planning.

In order to obtain input to the route selection process, WMATA tried to survey disabled individuals throughout the area. However, due to a low response to the survey, routes had to be selected in a different manner. First, to insure equity among the jurisdictions that make up the WMATA region, the accessible fleet was distributed in proportion to total Metrobus services. Specific routes were then selected in each major corridor with particular consideration given to interfaces with Metrorail, the location of key travel generators, accessibility of the environment, suggestions of the jurisdictions and identified needs of the voluteers who had participated in the trial service.

WMATA decided not to implement service using all the lift-equipped buses, but to maintain a large spare ratio (i.e., three for each five buses in scheduled service) in order to

compensate for anticipated lift reliability problems based on reprints from other sites. WMATA also left some buses unassigned to routes in order to be able to respond to additional demands that might arise after start-up. Service was expanded somewhat during the course of the project, although expansion was limited by lift-bus reliability problems.

Although drivers were required to assume additional responsibilities in assisting the disabled, WMATA developed a fairly flexible set of operating policies and had no difficulties with the drivers or their unions during the demonstration period. WMATA utilized demonstration grant funding to train drivers and consumers, conducting disability awareness training sessions and skills training sessions for 2700 lift-bus drivers, and 25 field demonstrations for consumers. With SMD grant funding, George Washington University assisted in these efforts by developing the driver "disability awareness" training programs and training the driver instructors. With a great deal of coordination between WMATA and GWU, a comprehensive sensitivity training program was implemented that was geared to transit drivers.

Drivers rated both the skills and awareness training programs very highly and indicated that no problems arose during operations that were not covered in the training sessions. While GWU's evaluation of the training program indicated that awareness of and sensitivity to disabilities had increased, skills training proved to be less effective in actual operation. Instances of driver difficulty in operating the lift equipment occurred and resulted in some negative reports in the media.

As part of the consumer training, George Washington University trained rehabilitation and other allied health professionals to enable them to to offer lift-bus use training to their clients. Unfortunately, most of the professionals worked in acute care settings and did not have the opportunity to train many clients in the four months following the training program. GWU therefore concluded that such programs should be directed at social workers, recreation workers and rehabilitation counselors rather than acute care professionals. GWU also conducted an evaluation of possible engineering improvements to the equipment after observing consumers utilizing the lift and tie-down devices.

WMATA carried out additional marketing efforts to inform the disabled public and the general riding public about the lift service. This program took the form of public service announcements on television and radio, and distribution of flyers and brochures to individuals and agencies.

A Lift Bus Project Coordinator was employed to administer the project, prepare reports, assist in preparation of procedures guides, supervise data collection and act as liaison to the public. In addition, a special User Trainer was hired to conduct the field demonstrations. A Lift Bus Program Shop Supervisor was responsible for lift shop maintenance, employing two shop mechanics. Each of the eight divisions employed and determined work priorities for a lift mechanic at the garage level.

EQUIPMENT

Following numerous modifications to the lift, made with the assistance of the lift and bus manufacturers, the lift has performed reliably in WMATA's view. Passengers also found little difficulty with the lift or tiedown devices, according to survey results. However, drivers have been split on their assessment of lift reliability, with many having experienced difficulties in operating the lift. Despite the lack of obvious design flaws in the modified lift mechanism, maintenance has proved to be a problem.

Preventive maintenance on the lift was not performed in a consistent manner over the course of the project and varied across WMATA's eight regional divisions. After a review of the lift maintenance program in January 1981 (1½ years after start-up), the preventive maintenance procedures were simplified and an effort was made to adhere to them more strictly. Lift availability did not improve at all, however, after the change. An average of 14% of lifts have been out-of-service over the project period and about 20% of lift buses have been out-of-service. As a result, accessible runs have been provided by buses with inoperable lifts or non-lift-buses, despite the large number of spare lift-buses.

The expenditure of mechanic-hours on the lifts has been considerable, averaging about 6 hours per lift each month. Yet this is only about half the amount originally dedicated to the lift program by the hiring of 10 lift mechanics. The diversion of lift mechanics to non-lift maintenance took place despite poor lift availability.

Much of the lift repair hours were due to accidental damages and driver error in operating the lift. Although changes to the lift control box and the lift mechanism were pursued and, in some cases, implemented, damages continued to occur. WMATA believes that the lift devices are still too sensitive to damage and that driver error is not necessarily a result of driver negligence.

SERVICE QUALITY

Accessible service was provided on slightly over one quarter of WMATA's Metrobus lines. However, service on the selected lines was only partially accessible, since it was provided only on selected routes (branches) and then with approximately hour headways between scheduled accessible trips. On weekdays, only 8% of scheduled bus trips were accessible. The poor reliability of service due to lift-bus availability problems reduced the actual percentage of accessible trips to even less than that. About 15-20% of scheduled accessible trips were provided with inoperable lifts or non-lift-buses. As a result an average of 10% of attempted lift boardings were denied. These denials of service constituted the most serious problem with the lift-bus according to surveyed lift-users.

While the lift equipment seemed to overcome the barrier posed by the vehicle's front steps fairly well, other barriers persisted and were noted by lift-users as major problems. Both users and non-users indicated a variety of difficulties which the lift does not address. A particularly important issue was difficulty getting to the bus stop. This suggests that the problem of low ridership on lift-bus services will not be solved by improving the reliability of lift devices alone.

RIDERSHIP

Lift ridership was very low (about 7-8 boardings per day) and declined over the course of the project; during spring and summer 1981 it is estimated that fewer than 10 individuals were making use of the service.

The low ridership that resulted may be in part due to the poor service quality both in terms of coverage and reliability. In turn, the ridership level also is likely to have contributed to the fact that service quality did not substantially improve over the course of the demonstration. If a higher level of ridership had developed, there might have been greater pressure to improve driver skills, lift maintenance and lift-bus assignment procedures.

Over 50 individuals who had made use of the service were identified in surveys. These users were disproportionately mobile, male, young, and affluent; none were senior citizens, despite the fact that senior citizens comprise a considerable portion of the disabled population. Although the lift was available for use by semi-ambulatory individuals, most of the lift-users were wheelchair-users. Surveys of non-users indicated that there was considerably less awareness of the service among non-wheelchair individuals.

TRAVEL BEHAVIOR

The automobile was the dominant travel mode among the lift-users and non-users who participated in evaluation surveys. While driving is a "frequently available" mode for about half of users and non-users, the availability of other modes differs between the two groups. Non-users were more likely to have the option of riding with a friend or relative than were lift-users; lift-users were much more likely to perceive Metrorail service as an option available to them.

The perceived inconvenience of the accessible Metrobus service (in terms of bus stops, routes, schedules, etc.), rather than physical inability to use the lift-bus, seemed to be the major factor in discouraging ridership among non-users. Non-users were less likely than users to perceive that a bus stop was located at a "convenient" distance and were willing to travel less distance to get to a bus stop. Although users were willing to travel a considerable distance to a stop, most in fact needed only to travel 1-2 blocks.

OPERATOR PRODUCTIVITY AND IMPACTS

The introduction of accessible bus service caused little disruption to existing service because lift usage was so low. Run, dwell and layover times were relatively unaffected, and thus no additional vehicles (or drivers) were required to meet the demands of the schedule. However, frequent lift malfunctions impacted the operators' ability to maintain the accessible bus schedule; a high percentage of accessible runs had inoperable lifts or non-lift-buses, greatly reducing the level of service provided to the target population.

Drivers felt the sensitivity awareness and operations training programs were very valuable. These programs, coupled with the low level of lift utilization, may have been responsible for the fact that drivers generally did not perceive duties related to lift operation to be burdensome, despite substantial equipment problems.

Statistics show that lift-equipped buses cost more than non-lift equipped buses to maintain and repair. Some of this was due to mileage related costs incurred by the substantially heavier usage of the accessible fleet, rather than lift repair and maintenance. Lift-related maintenance costs amounted to about $2100 per year per bus including both parts and labor. The total operating costs of the project are estimated to have been over $400,000 per year (in 1981 dollars) including annualized costs of training and marketing. The operating cost per

lift trip was $227 per trip due to the low ridership. When capital costs are included, cost per lift trip is estimated to have been as high as $329. While the above figures are only rough estimates due to cost data inadequacies, it is clear that the per trip costs are quite excessive.

CONCLUSIONS

1. Washington's lift-bus project failed to generate substantial ridership due to a combination of factors, including poor reliability, inconvenient service characteristics, and the availability of more convenient travel alternatives.

2. It appears that even if service reliability were improved, many non-users would not make use of the lift-bus due to an unwillingness to travel distances necessary to reach a bus stop, the barriers posed by curbs and the fact that many have automobile alternatives.

3. The few lift-users were atypical of the target population in that they were younger, more mobile, and predominantly employed males. Generally, these users had automobile alternatives and traveled on the lift-bus by choice. However, few continued to use the lift throughout the demonstration period.

4. The absence of ridership among the elderly, female and low income groups may indicate that fixedroute service does not offer a viable mode for these individuals, who typically are the target population of programs for the transportation handicapped.

5. The lift equipment design posed little or no problem to the users and did not constitute an issue of concern to non-users.

6. The lift devices required several modifications in order to reach a satisfactory level of performance from the operator point of view. However, even after improvements, lift maintenance costs were high and lift-bus availability was low. It is believed that improved lift design is one possible solution to this problem. It also appears that WMATA could have taken action to reduce these equipment problems, such as better management of spare vehicles, establishing a higher priority for lift maintenance, and monitoring drivers who caused expensive damages to the lift.

7. As a result of both lift maintenance and the extensive training programs the operating cost of the lift program was high. Combined with low ridership, the resulting cost per trip is excessive, on the order of $300 (including equipment depreciation).

8. The special demonstration-funded training programs for drivers and consumers were well-received. Drivers rated the training programs valuable and a considerable portion of the (small number of) users indicated in a survey that the field demonstrations were influential in their decision to try the lift-bus. The value of the field demonstrations was probably limited by other deficiencies which impacted ridership; that is, the demonstrations encouraged people to try the service but did not result in sustained ridership.

9. Because the service was designed to be only partially-accessible and reliability was seriously deficient, the results of the demonstration are not conclusive regarding the effectiveness of the fixed-route service concept for the disabled. Nevertheless, the project has highlighted the importance of various convenience factors in the mode choice of the disabled.

1 PROJECT BACKGROUND AND OBJECTIVES

1.1 DEMONSTRATION OVERVIEW

1.1.1 Description of the Demonstration

In response to legislative developments on the national scene and local concern about the lack of accessibility of transit, the Washington Metropolitan Area Transit Authority (WMATA) introduced accessible fixed-route bus service on selected bus trips on several routes in July 1979. With UMTA capital grant assistance, the authority obtained 131 new 40-foot Flxible buses equipped with Vapor front-door lift devices and two tiedown locations, and 20 similar 31-foot buses, making 8% of its fleet accessible. The net effect was to make 8% of all weekday Metrobus trips accessible.

WMATA conducted consumer marketing efforts and, together with the George Washington University Rehabilitation Research and Training Center (GWURTC), carried out special training programs for drivers. GWURTC was primarily responsible for preparing the driver training programs, training WMATA driver instructors and evaluating the training programs. GWURTC also trained agency rehabilitation personnel, who would in turn train the handicapped in using the lift devices, and evaluated the equipment from the handicapped user's perspective developing recommendations for low-cost aids to facilitate use of the service. UMTA Service and Methods Demonstration (SMD) Program funding supported the training and marketing activities, as well as all data collection, through grants to both WMATA and GWURTC. The Transportation System Center (TSC), which serves as the research branch of the U.S. DOT and routinely conducts SMD demonstrations, conducted an evaluation of the overall accessible bus service project for UMTA, through its evaluation contractor, Multisystems, Inc.

The WMATA accessible bus project added significantly to the current knowledge regarding accessible bus services, their costs and impacts. While a number of similar services were concurrently implemented across the nation, the WMATA service has had some unique aspects, specifically with respect to the scope of training activities undertaken and the availability of

an accessible rapid rail system. This section briefly describes the specific innovations that took place in Washington, D.C., relevant activities on the national scene, and the focus of the evaluation that was undertaken.

1.1.2 Demonstration Objectives

The objectives of the demonstration as outlined by the grantees include the following:

1. To impart a better understanding of the needs of the handicapped to WMATA trainers, bus drivers, and support staff.

2. To impart an understanding by trainers of the handicapped of the skills needed by the handicapped person to utilize accessible buses.

3. To produce packaged training materials which could be transferred to other metropolitan areas.

4. To affect the design and modification of future accessible buses.

5. To develop low cost aids to increase mobility of the handicapped person using accessible buses.

6. To assess service strengths and limitations as viewed by the handicapped and non-handicapped ridership.

7. To increase awareness of the transportation needs of the handicapped through dissemination of project training packages and reports.

8. To develop a more accessible system for many ridership groups other than the handicapped, such as the elderly and mothers with children.

9. To guide WMATA's future actions in the area of special needs transportation.

The primary focus of the WMATA accessible bus project is one of the major objectives of the SMD program: to improve the mobility of the transit dependent. Because handicapped people are often either unable to obtain drivers' licenses, unable to drive standard vehicles, and/or unable to purchase a specially equipped automobile, many are transportation-disadvantaged. Unfortunately, in the past, they have been further disadvantaged by the inaccessibility of transit vehicles and services.

Thus, this project attempts to improve the mobility of handicapped persons by equipping vehicles with lifts which enable handicapped persons, particularly wheelchair users, to board regular transit vehicles which provide fixed-route service.

The other SMD objectives* are not directly addressed by the project. In some cases, the possibility of a negative impact on level of service must be examined; for example, travel time may increase because of the time required to operate the lift for wheelchair passengers. Furthermore, these delays, and the removal of seats to accommodate wheelchairs, may affect productivity. This evaluation therefore addresses not only how the project meets the mobility needs of the transit dependent but examines the impacts.

1.1.3 Background and Rationale for Selecting the Service Concept

The accessible fixed-route bus service implemented by WMATA was developed in response to pressures from both the federal and the local level. "Special efforts" were required by the Urban Mass Transportation Act Amendments in 1970 to assure availability of transit service to the elderly and disabled. Local handicapped groups in the Washington, D.C. area have also been instrumental in pressing for accessible bus and rail service.

WMATA responded to the handicapped community by proposing and carrying out a number of actions aimed at increasing accessibility of the transit service, of which the demonstration is but one. In addition to the demonstration project, WMATA proposed to coordinate with other interested agencies in the establishment of a Central Referral System for special transportation and to establish a permanent Elderly and Handicapped Advisory Committee (only the latter took place).

Aspects of the service concept which had remained unresolved for some time were whether semi-ambulatory persons would be permitted to use the lift and how the accessible buses would be distributed. Input from the handicapped community helped WMATA to solve the first issue; a decision was made to allow semi-ambulatory persons to use the lift, with the help of special markings on the lift platform to indicate where to stand to avoid any possible injury.

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*These include:
- Decrease transit travel time
- Increase transit reliability
- Increase transit coverage
- Increase transit vehicle productivity.

The various local governmental jurisdictions had input to the decision on the distribution of buses. A number of alternatives had been outlined by WMATA including:

1. concentration of service in a single corridor;

2. even distribution of buses to corridors;

3. holding some buses in reserve to respond to requests; and

4. assigning the entire fleet based on identified demands.

For political reasons (equity among jurisdictions), a single corridor was not a feasible choice. Consequently, WMATA decided to provide service in most major corridors, keeping a small reserve (10 vehicles) to respond (to the extent possible) to specific demands not anticipated in service planning. To maximize potential benefits, WMATA selected radial routes which connect with Metrorail stations (all of which were already accessible).

The Accessible Bus Demonstration officially began in December 1978 and ended in August 1981. During the demonstration WMATA operated 136 bus "lines" each of which included several branch "routes." The lift-equipped buses operated on 69 routes on 38 of these lines. However, accessibility on these routes was achieved for only a portion of total bus trips, providing approximately hourly service for disabled people. Systemwide, it has been estimated that 8% of weekday one-way bus trips are scheduled to be accessible.

To provide this degree of accessible service, WMATA employs 95 lift-equipped buses. This is only a portion of the fleet of 151 1978 accessible Flxible buses. The remainder of the accessible buses were reserved for use as spares. The accessible buses represent 8% of WMATA's total fleet. In addition to the current lift-equipped fleet, WMATA obtained 130 similar buses without lifts but with factory-made structural modifications to accommodate later retrofitting if desired.

A variety of factors make this demonstration particularly interesting:

1. Washington, D.C. is one of the few metropolitan areas in the nation with an accessible rail rapid transit system. Thus, the addition of accessible bus service enables disabled persons to make use of a very extensive multimodal transit system.

2. Demonstration funding has enabled the development of comprehensive operator and consumer training programs by professionals in the rehabilitation field.

3. WMATA's operating policies attempt to maximize lift use by: permitting the ambulatory disabled to ride the lift while standing, requiring drivers to assist passengers when necessary, tailoring routes to demand as the project progressed, and allowing lift use on those lift-equipped buses not making scheduled accessible trips.

While the lift equipment was not purchased through Service and Methods Demonstration (SMD) Program funding, SMD grants were made to WMATA ($240,000) and George Washington University's Rehabilitation Research and Training Center, GWURTC, ($410,000)* for particular activities relating to the accessible bus service during two and one half years commencing December 1978. GWURTC's role was to develop training programs for WMATA drivers and instructors, rehabilitation professionals and handicapped consumers. WMATA drew upon these materials for training of its bus operators and for marketing the service to potential users. Portions of the GWURTC and WMATA grants were also used for data collection activities required for the evaluation of the project.

Thus the demonstration had five principal elements:

1. A sensitivity training program for Metrobus operators;

2. Identification of the handicapped market;

3. Training of handicapped consumers;

4. Collection of data relating to the experience of users, non-handicapped bus riders and bus operators; and

5. Preparation of training materials useful to other transit properties.

These activities are discussed in detail in Section 3.

While GWURTC evaluated the effectiveness of its training programs, Multisystems, Inc., under contract to the U.S. DOT Transportation Systems Center, was responsible for evaluating the impacts of the accessible bus service on the handicapped lift-users, the non-handicapped bus riders, the operator of the service and other impacted groups.

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*GWURTC's activities were funded partially by the Rehabilitation Service Administration (HEW), through an additional $50,000 grant.

1.2 NATIONAL PERSPECTIVE

1.2.1 Legislation and Regulations

Although WMATA's accessible bus demonstration was planned before the issuance of U.S. DOT's Section 504 regulation on accessibility, the project is a product of a movement to provide accessible transit service that began in the late 1960's. This movement toward accessible transportation systems and facilities may be viewed as an outgrowth of the movement for the civil rights of minorities, which made great strides in the 1960's. The 1964 Urban Mass Transportation Act and subsequent amendments recognized the need to address the rights of disabled people. In 1970, Section 16 was added to the Act, specifically declaring that "elderly and handicapped persons have the same right as other persons to utilize mass transportation" and requiring that "special efforts shall be made in the planning and design" to assure availability of services they can "effectively utilize."**

The net result was to provide a general legislative mandate for planning and providing accessible transportation; however, the implementation and administration of this mandate based on executive regulations became somewhat controversial and subject to litigation. The most public part of this controversy has been a debate between "accessibility," meaning physical access to all modes whether or not they can be used, and "mobility," meaning adequate transportation regardless of its source. Typically, accessible fixed-route transit exemplifies "accessibility" and special demand-responsive systems for the elderly and handicapped exemplify "mobility."

The Federal-Aid Highway Act of 1973*** for the first time included provisions for the expenditure of federal-aid highway funds on public mass transportation projects. It required that such public transportation projects be designed so that facilities and service could be effectively utilized by the elderly and the handicapped. It also further amended the UMT Act, adding new subsections to Section 16 which authorized grants and

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*Portions derived from Applied Resource Integration, Ltd., Evaluation Plan for Bi-State Development Agency, (St. Louis) Accessible Bus Project, prepared for U.S. Department of Transportation, Transportation Systems Center, January 1978 and American Public Transit Association, Elderly and Handicapped Public Transportation: A Status Report, January 1977.

**Public Law 91-453.

***Public Law 93-87.

loans to both state and local public bodies and private non-profit agencies to assist them in meeting special transportation needs of the elderly and handicapped.

Even as amended, Section 16 did not specify a method for meeting the special mobility needs of the elderly and handicapped, but proponents of accessibility argued that total accessibility was the intent of the law. These arguments notwithstanding, the amended language in Section 16 did not mandate a specific accessibility standard and UMTA did not interpret Section 16 as requiring full accessibility. UMTA's primary efforts in the wake of the 1973 amendments were directed toward implementing the new Section 16(b)(2) program. This program was not designed to address the central issue of public mass transportation for the elderly and handicapped, but rather to assist private non-profit corporations in providing transportation services meeting the needs of the elderly and handicapped for whom mass transportation services planned, designed, and carried out by public agencies are unavailable, insufficient, or inappropriate.

In subsequent years, legislation concerning transportation of the elderly and handicapped became more specific in its application, thus narrowing the range of available options. For example, the Federal-Aid Highway legislation passed in 1974 included a restatement of the UMT Act Section 16(a) national policy language.* It amended Section 165(b) of the 1973 Highway Act to require that projects aided under specific federal program be "planned, designed, constructed and operated to allow effective utilization by elderly and handicapped ... including those who are non-ambulatory wheelchair bound..."

The National Mass Transportation Assistance Act of 1974 amended Section 5 of the UMT Act to include a new formula grant program for operating and capital assistance. In this section, Congress mandated a specific benefit to elderly and handicapped persons for the first time. Section 5(m) requires that:

> ...the rates charged elderly and handicapped persons during non-peak hours for transportation utilizing or involving the facilities and equipment of the project financed with assistance under this section will not exceed one half of the rates generally applicable to other persons at peak hours...

To carry out the policies outlined in the various amendments to the UMT Act, UMTA published a set of regulations in

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*Public Law 93-643

April 1976 to establish its requirements on transportation for elderly and handicapped persons. The final regulations required that the urban transportation planning process include special efforts to plan public mass transportation facilities and services that can be used effectively by elderly and handicapped persons. UMTA defined elderly and handicapped in the transportation context as:

> those individuals who by reason of illness, injury, age, congenital malfunction, or other permanent or temporary incapacity or disability, including those who are non-ambulatory wheelchair-bound and those with semi-ambulatory capabilities, are unable without special facilities or special planning or design to utilize mass transportation facilities and services as effectively as persons who are not so affected.*

The regulations did not specify what types of special efforts were required but did provide examples of satisfactory levels of effort. In addition, UMTA outlined specific requirements of the approval of funds for construction, design, or alteration of fixed facilities and for purchasing of new buses (over 22 feet long) and new light rail and heavy rail vehicles.

In September 1977, the UMTA regulations on Transportation for Elderly and Handicapped Persons were amended to reflect the Transbus mandate. In 1971, UMTA had initiated a major research project to develop an improved transit bus that would attract mass ridership, be accessible to elderly and handicapped persons, and encourage continued competition among bus manufacturers. While the "Transbus" specifications initially did not require a ramp or lift device, the final DOT regulations of May 1977 mandated a low-floor ramped bus. The specifications required: a stationary floor height of not more than 22 inches; an effective floor height (including a kneeling feature) of not more than 18 inches; and a ramp for boarding and exiting.

A number of transit properties began procurement for Transbus. However, in May 1979 no bids were submitted for production of 530 Transbuses for a Philadelphia/Miami/Los Angeles Consortium. As a result, DOT commissioned an investigation by the National Research Council (NRC) to determine whether the bus could be built. The NRC report concluded that "the country's two remaining transit bus manufacturers made the right decision when they decided not to bid on Transbus ..."

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*Federal Register, Vol. 41, No. 85, Section 609.3, p. 18239; Friday, April 30, 1976.

due to "... considerable financial risk and unproven technology."* In September, 1979, however, DeLorean Motor Company of New York City, announced it would build 12 prototype models of Transbus based on the standard West German bus.** Furthermore, Volvo experimented with and eventually developed accessible low floor ramp-equipped buses in Sweden.

The most powerful overall legislative influence on transportation for the elderly and handicapped has probably been the Rehabilitation Act of 1973***, Section 504 of which provides that:

> ...No otherwise qualified handicapped individual in the United States, as defined in Section 706(6) of this title, shall solely by reason of his handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal assistance...

The Department of Health and Human Services (formerly HEW) was given overall responsibility for administering the Act, including supervising the development of compliance programs by other administrative departments for federally funded programs. HEW published final guidelines in January 1978, fulfilling its role as coordinator for implementation of Section 504. Some important aspects of the HEW guidelines are noted below:+

> ...The Department...does not construe the section... to preclude in all circumstances the provision of specialized services as a substitute for, or supplement to, totally accessible services, nor...require door-to-door transportation service. Neither does... it require buses to move their regular route stops to the doors of handicapped riders. A recipient (of federal aid)...may not...provide different or separate aid, benefits, or services to handicapped persons or to any class of handicapped persons than is provided to others unless such action is necessary to provide qualified handicapped persons with aid, benefits, or services that are as effective as those provided to others.

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*"Report Blasts Transbus," Passenger Transport, American Public Transit Association, September 7, 1979, p. 1.

**"DeLorean Motor Co., Contends Its DMC-80 Can Be America's Transbus," Urban Transport News, Oct. 22, 1979, P. 170.

***Public Law 93-112.

+Federal Register, Vol. 43, No. 9, Part V, pp. 2132-2139; Friday, January 13, 1978.

> A recipient shall operate each program or activity so that the program or activity, when viewed in its entirety, is readily accessible to and usable by handicapped persons. This paragraph does not necessarily require a recipient to make each part of its existing facilities or every part of an existing facility accessible...

In June 1978, the Department of Transportation proposed its regulations to implement Section 504; hearings were held to obtain comments from the public, interested consumer groups, and the transit industry. In May 1979, its final rules pertaining to Section 504 were issued. The rules outlined changes to be achieved and a time-table for compliance. In general, accessible public transit was mandated as the legally required long-term solution to urban public transportation for handicapped individuals. In particular, DOT's rules required the following for any federally funded bus system:*

1. All public transit buses purchased after July 2, 1979, must be accessible to handicapped persons, including wheelchair users.

2. Fixed route bus systems should achieve program accessibility as soon as practical, but no later than three years from the date of the regulation.

   - Half of the peak hour bus fleet must be accessible within ten years.

   - Accessible vehicles must be used before those which are non-accessible in off-peak hours.

3. Accessible connector service must be provided between accessible and non-accessible rapid rail stations.

4. Where service cannot be made accessible within three years, some form of interim accessible service (such as retrofitting lifts to old buses, or supplying some form of temporary taxi service) must be offered.

   - The interim service must be comparable to the fixed-route services (to the extent feasible) in such characteristics as wait and travel time, area served, fare, trip restrictions, etc.

   - At least 2% of Section 5 funds must be expended on interim service.

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*There were also specific requirements for rail systems.

The regulations also permitted operators of existing rapid rail systems to provide handicapped persons with some form of bus or taxi service instead of adapting the rail system, if local handicapped persons and DOT agreed to the alternative plan. At least 5% of Section 5 funds had to be used for such alternative service.

The DOT rules for implementing Section 504 guaranteed handicapped persons their civil rights with respect to the use of public transit systems, but the barriers which still remained in the community led many to question the resulting improvement in mobility. They argued that accessible transit is a less effective alternative for improving the mobility of handicapped individuals than solutions involving combinations of paratransit and conventional transit. The high cost of implementing the changes mandated by DOT's rules for Section 504, coupled with predictions that these changes would remove barriers for relatively few users, created considerable controversy.*

On June 29, 1979, the American Public Transit Association and 12 transit systems filed suit asking for preliminary and permanent injunctions barring enforcement and implementation of the regulations on the basis that:**

1. DOT and HEW went far beyond their statutory authority in drafting the regulations;

2. The regulations were arbitrary and capricious in their requirement of technology which does not exist and in their use of theoretical "accessibility" as a standard rather than actual effects in providing mobility; and

3. DOT failed to follow its own required procedures for environmental impact statements.

The U.S. District Court ruled that the 504 regulations would stand pending the filing of an environmental impact statement by USDOT. The decision also made reference to congressional authority in the matter, pointing out that

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*The controversy has extended to members of the handicapped community as well as transportation professionals. Some handicapped persons argue very strongly for mainstreaming via accessible fixed-route service, rejecting the notion of "separate but equal." Others argue just as vehemently that mobility is a prerequisite to achieving full equality.

**"APTA Sues Federal Government Over Accessibility Regulations," Passenger Transport, American Public Transit Association, July 6, 1979, p. 1.

"Congress is actively considering the regulations and the policy decisions there reflected."*

Furthermore, DOT's waiver provision was cited as offering relief from the regulations in specific cases where necessary; the court indicated it would "entertain applications for relief by those plantiffs justifiably dissatisfied with the administrative action (or inaction) or any petitions for waivers or extensions they have filed ..."** APTA appealed the February 7 ruling and the decision was eventually reversed. The court said that 504 was a non-discrimination statute that did not require "extensive and costly affirmative action."

In June 1980, a transit aid bill passed the Senate which included an amendment allowing transit operators some locally determined alternatives to full accessibility.*** The "Zorinsky" amendment required 5% of all federal funds under Section 3, 5 or 18 to be spent on special handicapped programs which provide adequate service levels throughout the area, comparable fares, reasonable wait times, no prior registration, and no restrictions on trip purpose. New bus purchases would have to be all accessible buses in areas of over 750,000 population and half accessible buses in areas of 50,000-750,000. A similar "Cleveland" amendment was introduced to the House. However, these amendments never made it through the 96th Congress.

The inauguration of the new administration in 1981 made a change in Section 504 likely. The adminstration's proposal was unveiled in May and put in effect on July 20, 1981 in an interim final rule issued by the Office of the Secretary. This regulation effectively rescinded DOT's May 1979 Final Rules implementing Section 504 and returned to the "special efforts" policy DOT introduced in Section 16 in 1976.

During the controversial period from 1978 to 1981, the attitude towards 504 varied from one transit property to another. Some transit authorities felt that their responsibility would end with putting (fixed-route) buses on the street, and they were quite willing to purchase lift-equipped vehicles. In particular, many smaller properties, for whom the cost of 504 compliance was relatively low, proceeded to implement full accessibility before the 1982 deadline. At some larger properties, the controversy was outweighed by local policies in favor

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*"Court Rules - 504 Regs to Stand," Passenger Transport, American Public Transit Association, February 8, 1980, p. 1.
**APTA Bulletin, February 13, 1980, p. 2.
***"Senate Approves Transit Aid Bill by 79-15," Passenger Transport, American Public Transit Association, July 27, 1980, p. 1.

of accessibility; both the Southern California Rapid Transit District and the Seattle METRO had announced plans to make their fleets fully accessible long before the 504 regulations were finalized. On the other hand, some properties had been hopeful that the 504 regulations would be modified and that increased flexibility would be afforded to the localities in meeting accessibility guidelines. These properties are unlikely to make fixed-route accessible service the mainstay of their Section 504 service, now that the regulations have been modified.

The developments in the transportation field described above parallel (and to a degree reflect) recent trends toward mainstreaming and deinstitutionalizing the physically and mentally handicapped population and providing education to all those with special needs. These factors, together with the fact that the elderly now comprise a greater percentage of the population than ever, will probably ensure a continuing interest in some form of accessible transportation services. With the return to "local option," the experience of the various experimental projects becomes especially valuable.

1.2.2 Demonstrations and Service Implementations

The UMTA Service and Methods Demonstration (SMD) Program has been specifically addressing the objective of improved transportation services to the elderly and handicapped through a number of projects. Throughout the course of these demonstrations, special services have been implemented and innovative techniques have been the subject of experimentation. Many alternative service concepts have been demonstrated through UMTA'S SMD program including:*

1. Service to the elderly and handicapped by a door-to-door transit system serving the entire community (Rochester, New York; Westport, Connecticut; and Danville, Illinois);

2. Special door-to-door service for an eligible transit dependent market, where the general public may have other transit modes available (Syracuse, New York; Baton Rouge, Louisiana; Cleveland, Ohio; Portland, Oregon; Chicago, Illinois; Mercer County, New Jersey; and New York City);

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*Donald Kendall et al., Service and Methods Demonstration Program Annual Report, U.S. Department of Transportation, Transportation Systems Center, April 1977, p. 93.

3. Special door-to-door service for an eligible transit dependent market, with sufficient surplus capacity to serve a limited segment of the general public (Naugatuck, Connecticut; Mountain View, California); and

4. Fixed-route transit service with special equipment on the vehicles to accommodate the transit handicapped (Palm Beach, Florida; Champaign-Urbana, Illinois).

In addition to these basic service alternatives, discounted fares and user-side subsidy* demonstrations have been implemented to increase mobility for persons constrained by financial need (in Danville, and Chicago, Illinois; Kinston, North Carolina; Montgomery, Alabama; and Lawrence, Massachusetts). Finally, several demonstrations have included greater roles for taxi and other private operators in the provision of transportation services for handicapped and other transit dependents (Montgomery, Alabama; Portland, Oregon; Kinston, North Carolina; Danville, Illinois; and Lawrence, Massachusetts).

While demand-responsive doorstep services can provide maximum accessibility and convenience, they are potentially more expensive than fixed-route service if widely applied, since they are constrained to operate with lower productivities than conventional transit services. In dense urban areas, it is believed by some that there are opportunities to achieve greater economic efficiency through the increased use of conventional transit services if these services are made "fully accessible." Of course, until services were demonstrated, there was little concrete evidence as to the demand for this type of accessible service.

Conventional transit vehicles pose barriers to the physically disabled due to floor heights and high steps. The Transbus program recognized this fact and was to require (in accordance with Section 504 of the Rehabilitation Act of 1973) that all full-size buses ordered after September 1979 have significantly improved accessibility via lower floors, wider doors, kneeling suspensions, and a retractable ramp entry for wheelchair users. While the "Transbus" was never produced, progress was made in developing other new accessible buses which incorporated lift devices as well as lift equipment for retrofit of older buses. The Vapor Travelift is only one of several lifts

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*User-side subsidy is a term applied to programs which provide direct subsidies to transportation users (rather than providers), usually through the use of pre-paid (often discounted) scrips redeemable for transportation service(s).

available. Lifts for transit buses are also produced by Transportation Design and Technology (Steplift), Lift-U, Transi-Lift, Collins and Environmental Equipment Corporation. In addition, General Motors Corporation manufactures its own lift. With some exceptions, bus manufacturers make more than one type of lift available with their bus models. Complete freedom in choosing the lift is not the case, however.

Lift-equipped fixed-route bus service is currently in operation in more than 100 locations across the country, with a total of over 6,000 buses or about 12% of the nationwide transit bus fleet. Table 1-1 summarizes the characteristics of some of these services.

In addition to evaluation of the SMD-funded projects in Palm Beach County and Champaign-Urbana, the SMD program has performed evaluations of accessible service in St. Louis, Seattle and Connecticut, and staff studies of the services in Atlanta and San Diego. California DOT performed four single-bus demonstrations of four different types of lifts in Sacramento, Alameda-Contra Costa Counties (AC Transit), San Francisco (Muni) and Long Beach.

A study by the Transportation Systems Center reviewing accessible bus service experience to date produced the following findings:*

1. Most transit operators are experiencing low levels of lift utilization on accessible fixed-route service. Surveys have indicated that the majority of wheelchair users either cannot or have no desire to use fixed-route bus service.

2. Delays due to lift boardings and alightings are generally small and very infrequent due to low ridership. Lift malfunctions on the road, however, can cause substantial delay. The random and infrequent nature of delays makes costly schedule changes unwarranted.

3. Current lifts are more reliable than earlier models but still suffer from frequent malfunctions. As a result a high spare ratio is necessary.

4. Operator error and accidental damages have contributed substantially to maintenance costs.

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*R. Casey, The Accessible Fixed-Route Bus Service Experience, U.S. Department of Transportation, Transportation Systems Center, May 1981.

TABLE 1-1. ACCESSIBLE SERVICES
(November 1980)

Site	Accessible Buses on Property	Bus/Lift Combination	Accessible Buses Scheduled in Peak	Percent of Peak Fleet Accessible	Number of Routes Accessible	Percent of Routes Accessible
Bridgeport	39	GMC/GM	23	48	14	100
Champaign-Urbana	40	25 Flx/EEC 15 GMC/EEC[1]	11	33	3	30
Connecticut Transit						
Hartford	155	Flx/EEC	152	64	21	100
New Haven	100	Flx/EEC	82	75	18	100
Stamford	25	Flx/EEC	24	86	8	100
Detroit						
DDOT	163	GMC/GM	110	18	8	14
SEMTA	111	GMC/GM	70	22[2]	8	15
Los Angeles	430[3]	200 AMG/TDT 230 Flx/EEC	159	8	21	10
Milwaukee	250	100 Flx/Vapor 150 GMC/GM	141	27	17	29
Orange County	175	GMC/GM	100	30	12	22
Palm Beach County	67	40 TMC/TDT 23 GMC/TDT[1] 4 GMC/RI[4]	50	100	19	100
St. Louis	157[3]	Flx/TDT	40	5	12	7
Santa Monica	47	Flx/EEC	35	35	10	83
Seattle	163	Fly/Lift-U	90	11	23	23
Washington, D.C.	150	Flx/Vapor	102	6	37	28
Wichita	31	26 GMC/GM 5 Chance/Vapor	31	67	19	100

[1] Retrofitted lifts are used in this combination.
[2] More than 22% of the peak buses are accessible, but only 22% are scheduled.
[3] Not all of the buses are being operated as accessible buses.
[4] The lifts used in this combination were furnished and installed by Recreational Industries. These buses are not used in fixed-route service.

SOURCE: Ibid.

5. The principal added costs to the operator of providing accessible service are the annualized equipment purchase cost, maintenance costs and the costs of driver and mechanic training. Recent demonstrations have shown their costs to be as much as several hundred dollars per passenger trip.

1.3 EVALUATION OVERVIEW

This evaluation of the WMATA experience should prove useful to all localities interested in the concept of providing accessible fixed-route bus service and should help guide UMTA in further policy decisions regarding transportation for the handicapped. Its major focus is impacts on the disabled (particularly the wheelchair-confined disabled), including the quality of service offered to this market segment and the resulting travel behavior changes. Impacts on the operator and other transit riders are assessed as well. Multisystems' evaluation plan outlined the objectives of the evaluation, the issues to be addressed, the impacts anticipated, and the analysis to be performed.* Several of the key issues are discussed below.

1.3.1 Key Evaluation Issues

The evaluation of the accessible bus service addressed a number of issues in the hope of expanding the knowledge obtained from other experience with accessible buses. These issues relate to:

1. Planning, implementation, and operations;
2. Equipment characteristics and suitability;
3. Effects on the level of service offered to lift users and non-users;
4. Travel behavior of lift-users and other riders; and
5. Operator productivity and economics.

These are discussed in greater detail below.

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*L. Englisher and A. Wexler, Evaluation Plan for the Washington, D.C. Accessible Bus Project, prepared for U.S. DOT Transportation Systems Center, by Multisystems, Inc., April 1979.

1.3.1.1 Planning, Implementation and Operations - The planning and implementation process is described here so that other localities may benefit from the WMATA experience. The most important questions are how various interest groups were involved in planning, how implementation was staged and what marketing/outreach and training efforts were necessary.

Marketing an essentially new transportation service to the physically handicapped and mobility-disadvantaged is a difficult task. This difficulty stems from the lifestyle accommodation handicapped people may have made to their present mobility limitations and to the psychological barriers to travel they may have developed. WMATA's approach to this problem provided valuable experience in the field. WMATA and GWURTC carried out a program to guide human service agencies in training the handicapped to use the service. The working relationships between WMATA, GWURTC and human service agencies is therefore clearly an important aspect of the implementation strategy.

Labor issues had also been a concern since transit drivers are generally not involved in dealing with handicapped persons and could have been concerned about the added responsibility of insuring the safety and welfare of physically handicapped people. Furthermore, operation of the lift might have been perceived as an additional job task and become a labor-management issue. WMATA and GWURTC carried out an extensive sensitivity training program for drivers, which is described in a separate report.* This report, however, considers only the costs of this training program and its impacts on driver attitudes so as to avoid duplicating WMATA and GWURTC's work.

1.3.1.2 Equipment Characteristics - Due to the nature of the innovations, the equipment as well as the service characteristics have been evaluated. Many previous implementations of lift equipped services experienced problems with equipment reliability and durability. Milwaukee, which utilizes similar Vapor lift devices, had difficulties with sagging and drifting of the lift, damage to lifts by obstructions not detected by the sensitive edge and danger of accidents due to incorrectly hitting switches while a passenger is using the lift. There was concern that WMATA passengers might also experience difficulty due to the angle of the lift platform and the narrow bus aisles. Thus the demonstration yields valuable information

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*Training and Evaluation Program in the Utilization of Accessible Buses, Final Report, The George Washington University Rehabilitation Research and Training Center (RT-9), December 1981.

from actual operating experience. The equipment design, reliability, and durability have been evaluated from the lift-user, non-user, driver, and operator perspectives.

1.3.1.3 Level of Service/Supply Characteristics - Key issues regarding the quality of the transit service may be grouped in three categories, differentiated by the group impacted.

For handicapped persons who utilize the lift, primary issues are the ability of users to rely on the service, the travel time and cost of the lift-bus compared to previous travel modes, and the convenience of a fixed-route service for use by the handicapped.

For non-handicapped riders, major issues are actual effects of the lift operation on the travel time, frequency and reliability of the bus service, and rider perceptions and reactions.

For the wheelchair-bound non-users of the service, major issues include how these non-users perceive the level of service, whether coverage is adequate, and what alternative modes they have available to them. The evaluation aimed at determining whether this non-user group is made up of those who:

1. cannot use the service due to its design;

2. are not served due to lack of coverage; or

3. are adequately served by and prefer to use other modes (private automobile).

It is particularly interesting in this demonstration to contrast perceptions of the level of service on Metrobus with Metrorail, both of which are accessible.

1.3.1.4 Travel Behavior

a. Ridership Trends - On the aggregate level, a most important issue is the extent to which handicapped ridership and total ridership are affected by the lift service. While equipping fixed-route buses with lifts provides the capacity to serve large numbers of handicapped people, the nature of fixed-route service limits the effective service area and thus prevents a significant portion of the handicapped from using it. The evaluation investigates what new markets are attracted to transit via the lift option. In addition, the potential for losing existing (nonhandicapped) riders due to any deterioration in level of service caused by use of the lifts is evaluated.

b. Characteristics/Behavior of Handicapped Users and Non-Users - There are a number of important questions that the evaluation aims to answer regarding the travel behavior of the handicapped. The use of accessible fixed-route transit by the handicapped may be limited to particular user types and particular trip types. For example, many elderly, frail, and more severely handicapped persons may find themselves unable to make use of the fixed-route service. Furthermore, many more able-bodied handicapped persons may find that the transit service is useful only for particular destinations, trip purposes or times of day. The travel patterns of users were investigated to provide data that may aid in the planning of transportation services for the handicapped.

For those wheelchair-confined handicapped persons who chose not to use the lift-buses, it was important to determine whether they: (1) were not particularly transportation disadvantaged; (2) already used Metrorail or some other service; (3) did not wish to travel; or (4) were really in great need of transportation but simply could not use the service as offered. Reasons for not using the service were determined and should provide some input to the design of other transportation services for the handicapped. Finally, the evaluation addressed the effectiveness of marketing and outreach efforts in making disabled people aware of the service and the impact of training programs.

1.3.1.5 Operator Productivity and Economics - While the installation of lifts on buses in fixed-route service is aimed at serving handicapped persons on the existing system and not overlaying new services on the present structure, there were increases in cost due to the project. Of particular interest are increases in the number of vehicles required, the number of driver hours, the driver wage rates, maintenance and repair costs, insurance costs and injury claims, as well as initial capital outlays for equipment. Furthermore, in order to achieve a successful implementation, extra marketing/training efforts were required; the costs of these efforts must be considered in planning for elderly and handicapped transportation.

The introduction of lift service may also have had significant impacts on the utilization of the vehicle fleet due to possible increased dwell times at stops, longer layovers and more spares required to maintain reliability, increased out-of-service time, and changes in passenger volumes. The effects of lift service on these important operator measures were assessed in the evaluation.

Since considerable expense is associated with equipping buses with lifts (and maintaining them) and with training programs, the utilization of the lifts is an important operator issue. Since non-wheelchair handicapped individuals, as well as wheelchair users, were permitted to use the lift, differentiating between these two groups is important for making comparisons with and transferring conclusions to other sites.

1.3.2 Overview of Project Data Collection

In order to address the key issues discussed above, the evaluation utilized a number of data sources. The primary data source was surveys of the disabled population, both lift-users and non-users (see Appendix B). Non-users were identified primarily through their human service agency affiliations and their employers. Lift-users were identified both by the WMATA Project Coordinator and in the course of the non-user survey. The surveys provided detailed information on tripmaking and on the socioeconomic and disability characteristics of the individuals and on their perceptions of the lift-bus service. Driver boarding counts included data on lift use by wheelchair and non-wheelchair handicapped persons.

In addition to data collection activities among the handicapped population, several sources were utilized to obtain data on other impacted groups. The perceptions of the non-handicapped bus riders were obtained through on-board surveys (see Appendix C). Also, surveys and interviews were conducted with bus drivers, mechanics, and the WMATA management to obtain the operators' perception of the project (see Appendix D). Dispatcher records and routine time checks provided travel time and reliability data. WMATA's financial and maintenance records provided additional data on operations.

1.4 READER'S GUIDE

The evaluation report is presented in eight chapters. Section 2 outlines the setting in which the project took place, while Section 3 discusses the planning required for the project and a variety of implementation and operations issues. The equipment and its suitability are discussed in Section 4, while Sections 5, 6, and 7 describe impacts on level of service, travel behavior, and operator productivity and economics, respectively. Project conclusions and their transferability to other sites are discussed in Section 8.

2. PROJECT SETTING

2.1 GEOGRAPHIC AND DEMOGRAPHIC CHARACTERISTICS

2.1.1 The Metropolitan Area

The Washington D.C.-Maryland-Virginia Standard Metropolitan Statistical Area (SMSA), illustrated in Figure 2-1, covers 2,812 square miles and is one of the largest metropolitan areas in the United States. It has a population (1980) of about 3 million people* distributed among the following jurisdictions:

District of Columbia	637,651
Maryland	
Charles County	72,751
Montgomery County	579,053
Prince George's County	665,071
Virginia	
Arlington County	152,599
Fairfax County	596,901
Loudoun County	57,427
Prince William County	144,703
City of Alexandria	103,217
City of Fairfax	19,390
City of Falls Church	9,515
TOTAL	3,038,278

Seventy-nine percent of the population in the SMSA is located outside the central city (D.C.) area, primarily in Montgomery and Prince George's Counties, Maryland and in Fairfax County, Virginia.

The median age in the metropolitan area is approximately 30 and per capita income is among the highest in the country. As

*1980 census data, courtesy of the Information Center, Metropolitan Washington Council of Governments (WashCOG).

Figure 2-1

THE WASHINGTON D.C. - MARYLAND - VIRGINIA SMSA

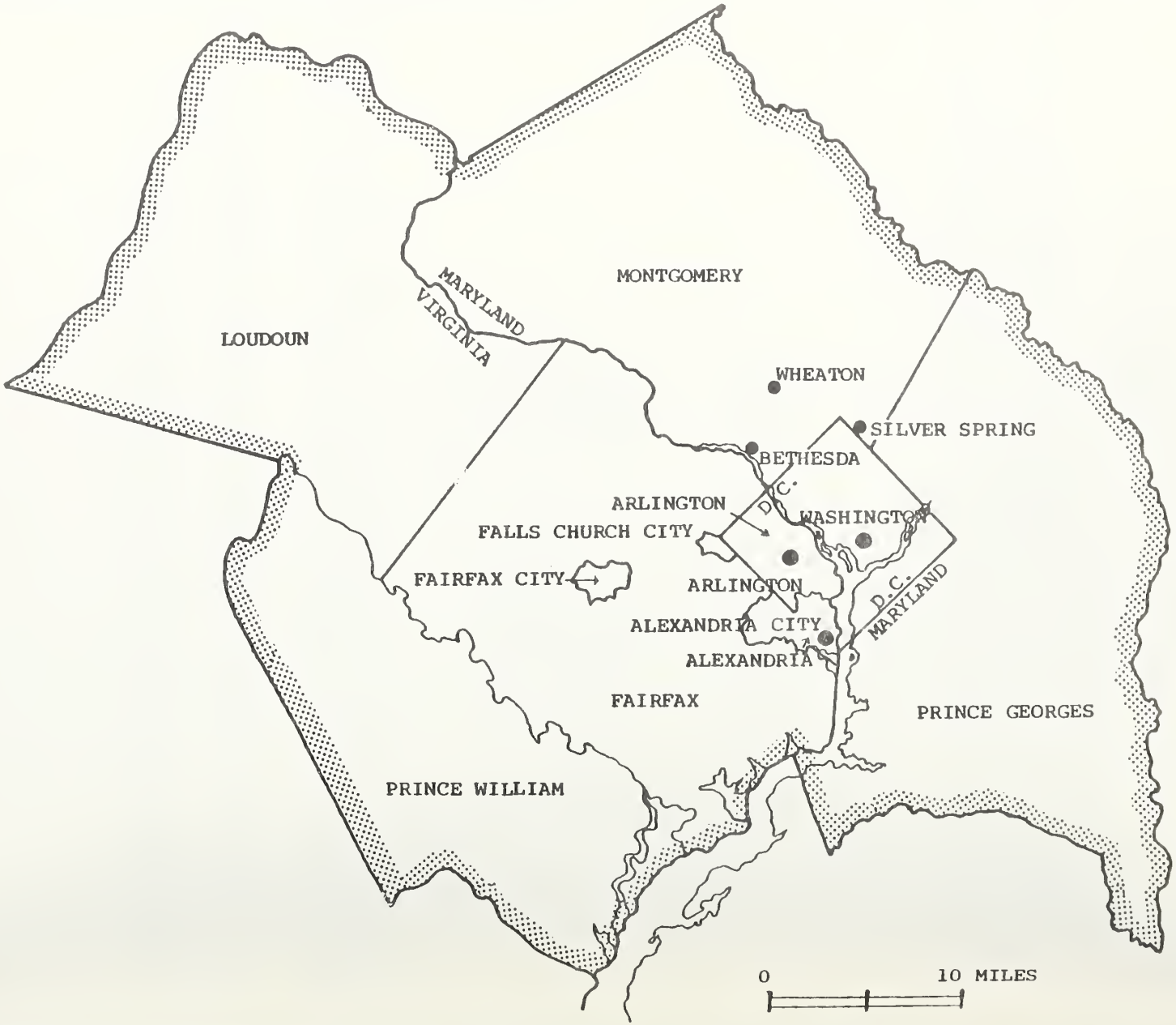

Table 2-1 shows, more than 50% of households (well in excess of national figures) have an annual income of $25,000 or more. As might be expected, government (federal, state, local) is the major employer (see Table 2-2) at a rate of about twice the national average. In 1981, the metropolitan labor force totaled 1.7 million people, with unemployment at a relatively low 5.1% (vs. more than 8% nationwide).*

2.1.2 The Elderly and Handicapped Population

Mark Battle Associates, Inc. (MBA) carried out a survey in 1976 to determine the incidence of elderly and handicapped residents in the Washington area.** "Handicapped" was operationally defined as "transportation handicapped" according to the following definition:

> . . . an individual who is, because of one or more physical or mental disabilities, constrained from performing all of the distinct actions required to use conventionally designed modes of transportation without experiencing more difficulties than individuals not affected by the disability(s).

Based on the survey, MBA estimated that elderly persons comprised 6.0% (183,770) of the population in the Washington D.C. Metropolitan Area, handicapped persons accounted for about 3.7% (112,545), and (eliminating overlap between categories) the overall incidence of elderly and transportation handicapped persons was 7.9% (238,704).***

The MBA figure for the elderly as a percentage of the population was consistent with other 1974 data which indicated that

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*Sales and Marketing Management, Survey of Buying Power, August, 1981; U.S. Department of Commerce, Bureau of the Census, Statistical Abstracts, 1979; U.S. Department of Labor, Employment and Earnings, January 1980; all courtesy of the Information Center, WashCOG.

**Mark Battle Associates, Inc. Transportation for Elderly and Handicapped Persons in the Washington Metropolitan Area. Conducted for the Metropolitan Washington Council of Governments, October 1978.

***These figures include 11,815 elderly and 27,182 handicapped persons in institutions.

TABLE 2-1. FAMILY INCOME IN THE WASHINGTON METROPOLITAN AREA (1980)

TOTAL FAMILIES	PERCENT
Under $5,000	5.9
$5,000-$9,999	6.6
$10,000-$14,999	9.5
$15,000-$24,999	25.0
$25,000-$49,999	42.2
$50,000 and over	10.8
TOTAL	100.0

Source: Information Center, WashCOG, from Sales and Marketing Management's Survey of Buying Power, December 1980.

TABLE 2-2. NON-AGRICULTURAL EMPLOYMENT IN THE WASHINGTON METROPOLITAN AREA (1981)

SECTOR	PERCENT
Service industries	27.9
Federal government	22.4
State, local government	12.1
Retail trade	15.6
Finance, insurance, real estate	6.0
Construction	4.6
Transportation, communications, utilities	4.3
Wholesale trade	3.6
Manufacturing	3.5
TOTAL	100.0

Source: Information Center, WashCOG, from Sales and Marketing Management's Survey of Buying Power, August 1981.

6.3% of the population in the Washington area was elderly.* This figure was low in comparison with the incidence of the elderly in the U.S. as a whole; in 1974, 10.7% of the U.S. population was elderly. 1980 census figures show that the relative percentage of elderly in the metropolitan area continues to be considerably below the national average: 7.0% vs. 11.3%. There has been an overall increase in the proportion of elderly both locally and nationally since 1974.

More than 70% of SMSA residents age 65 and over live in the District of Columbia or Montgomery and Prince George's Countries, Maryland. However, as Table 2-3 shows, while the proportion of the total elderly residing in each jurisdiction varies greatly (for example, 33.8% in the District of Columbia compared with 2.5% in Loudoun County, Virginia), the relative proportion of elderly within each jurisdiction is much more consistent (e.g., 11.4% in the District of Columbia compared with 9.5% in Loudoun County). These relative percentages have not changed greatly since the earlier figures were compiled.

The incidence of transportation handicapped persons in the population as derived by MBA (3.7%) is also somewhat lower than the national figure of 3.96% for all urban areas. Both figures reflect an operational definition of transportation handicapped similar to that used by MBA.** Unfortunately, more recent figures on the handicapped population in the Washington area will not be available until additional 1980 census figures are published.

2.2 TRANSPORTATION CHARACTERISTICS

2.2.1 Public Transportation

The Washington Metropolitan Area Transit Authority (WMATA) provides mass transit bus and rail service in the Washington Metropolitan Area Transit Zone which consists of: the District of Columbia; the Cities of Alexandria, Falls Church, and Fairfax (Virginia); and the Counties of Arlington and Fairfax (Virginia), and Montgomery and Prince George's (Maryland).

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*Washington Center for Metropolitan Studies, Washington Region 74, Population and Housing Data from the Washington Area Census Updating System, May 1975.

**U.S. Department of Transportation/Urban Mass Transportation Administration, Transportation Problems of the Transportation Handicapped: The Transportation Handicapped Population, Definition and Counts, Vol. 1, August 1976.

TABLE 2-3. THE ELDERLY IN THE WASHINGTON METROPOLITAN AREA

	Number of Elderly	Proportion of Total Elderly by Jurisdiction	Relative Proportion of Elderly Within Jurisdiction
District of Columbia	72,769	33.8%	11.4%
Maryland			
Charles County	4,795	2.2%	6.6%
Montgomery County	45,786	21.2%	7.9%
Prince George's County	33,808	15.6%	5.1%
Virginia			
Arlington County	13,949	6.3%	9.1%
Fairfax County	24,567	11.4%	4.1%
Loudoun County	5,430	2.5%	9.5%
Prince William County	5,343	2.5%	2.8%
City of Alexandria	8,017	3.7%	7.8%
City of Fairfax	864	.4%	4.5%
City of Falls Church	889	.4%	9.3%
TOTAL	216,217	100.0%	11.3% (overall)

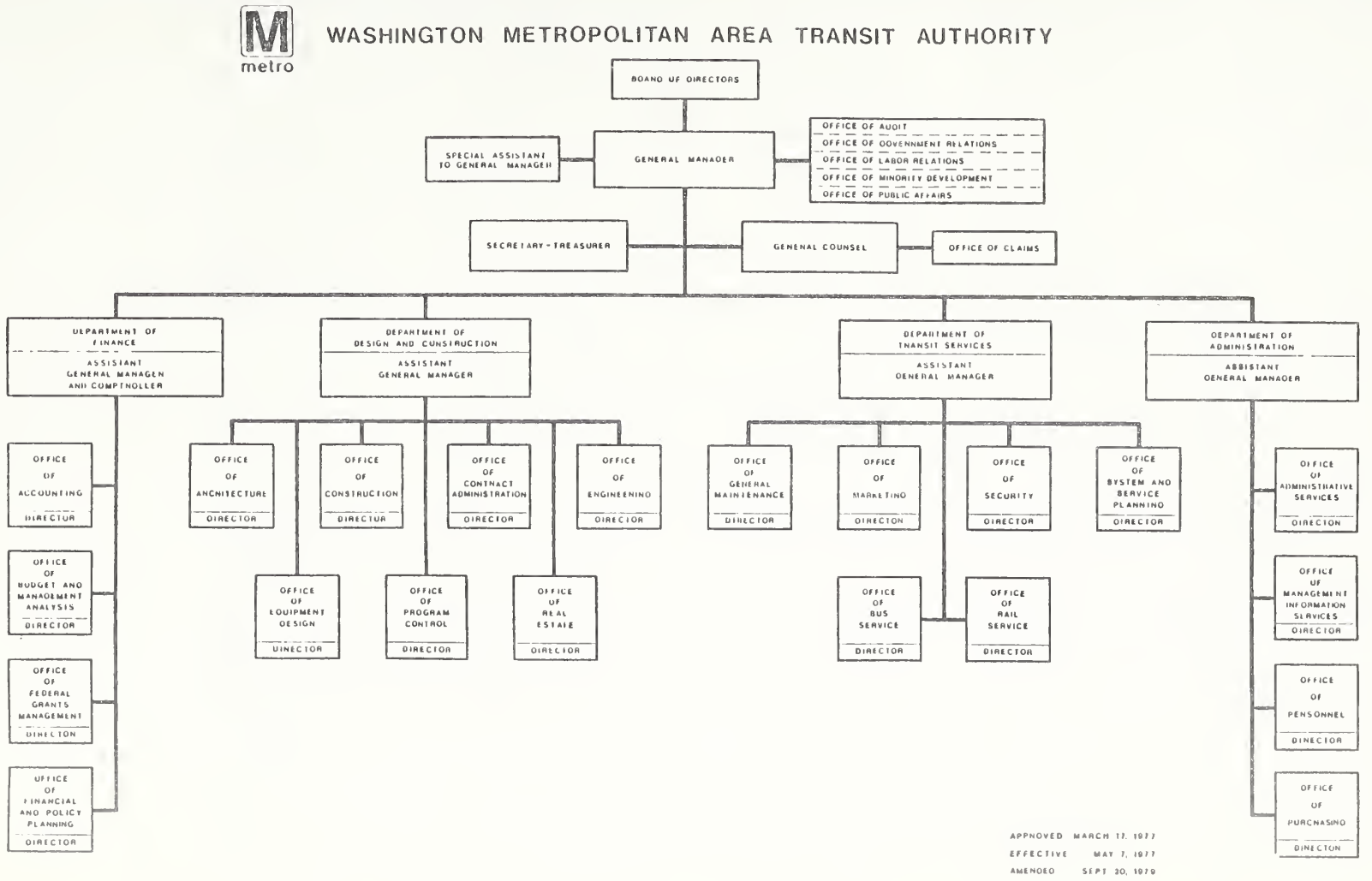
The various jurisdictions within WMATA's service area have different fare structures and service levels. WMATA receives operating subsidies from these jurisdictions, which are assessed based upon complex allocation formulas reflecting services delivered. WMATA has no independent source of tax revenue, an important issue since WMATA has increased its physical plant significantly with the opening and continuing expansion of the Metro.

Figure 2-2 illustrates the structure of WMATA as it existed during most of the demonstration period.* As the figure shows, WMATA is a complex and highly specialized organization. The General Manager is responsible for supervision of day-to-day

*WMATA was reorganized in August 1981, shortly before the demonstration ended.

Figure 2-2

WMATA ORGANIZATIONAL STRUCTURE



operations. He is aided by Assistant General Managers who head each of what were previously four main service divisions -- the Department of Finance, the Department of Design and Construction, the Department of Transit Services, and the Department of Administration. The service divisions are further divided into specialized offices, each headed by a Director. (Reorganization has created a fifth division, the Department of Public Services, which is comprised of some offices formerly part of other divisions as well as some offices which previously reported directly to the General Manager.)

Overall responsibility for coordination of the accessible bus project (and other specialized projects undertaken by WMATA) rested with the Office of Financial Policy and Planning, then in the Department of Finance. Actual operations were handled by the Department of Transit Services, the largest of WMATA's four departments, through its Office of Bus Services. Further details concerning the organizational responsibility for the project can be found in Section 3.

When the Metrorail Blue Line through downtown Washington opened in July 1977, the Metrobus system was restructured from a radial line haul to a feeder service with major route and schedule changes. As additional sections of the Metrorail system are completed and put into service, bus service in the area continues to be restructured to provide line haul service focused on the new Metro stations.

2.2.1.1 Metrobus - During fiscal year 1981, WMATA operated a total active fleet of about 1,760 buses over 391 routes on 122 lines, for an annual total of about 55 million operating miles. Total Metrobus ridership for FY 1981 was 141,411,378 (excluding approximately 8.6 million school trips), with a weekday average of 457,790 passenger trips. Over the course of the demonstration (i.e., since fiscal year 1978), annual ridership has grown by about 30 million passenger trips, while total annual bus miles have remained approximately the same and the total active fleet has decreased. This indicates increasingly efficient use of the existing fleet, in part attributable to the restructuring process carried out in conjunction with additions to the Metrorail system. This restructuring helped to eliminate unnecessary and duplicative routes. In fact, the total number of routes decreased almost by half between 1978 and 1981. (This is in large part due to route simplification rather than a wholesale elimination of service; many routes were combined, although unproductive segments were eliminated.)*

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*WMATA, Office of Financial and Policy Planning.

Table 2-4 presents Metrobus' current (1981) fare structure. Figure 2-3 illustrates the present fare zone configuration. The elderly and handicapped can ride the bus for half fare (or less) at any time upon presentation of an I.D. card obtained through special Metro sales outlets. An attendant accompanying a handicapped passenger may also ride for this reduced rate if a valid I.D. card is presented.

Passengers wishing to transfer from Metrorail to Metrobus may obtain a transfer ticket at Metrorail station which is good for a portion of the Metrobus fare. However, due to the nature of Metrorail's automated fare collection system (described below), similar transfers from bus to rail are not possible.

The total operating cost for Metrobus service was $175.9 million in FY 1981, versus total revenues of $81.7 million. The cost per total (revenue and non-revenue) bus mile was $3.21, and the cost per passenger was $1.24. This translates into an overall revenue/cost ratio of 0.46 for FY 1981.*

2.2.1.2 Metrorail - Forty-three Metrorail stations are currently open along 37 miles of the proposed 101-mile system, extending to three suburban Maryland and two suburban Virginia locations (see Figure 2-4). During the course of the demonstration, ten stations and seven miles of track were completed and opened in suburban locations. The system is expected to be completed in the mid- to late 1980's. Weekday Metrorail service operates from 6:00 a.m. to midnight, Saturday service from 8:00 a.m. to midnight, and Sunday service from 10:00 a.m. to 6:00 p.m.

Metrorail utilizes an automatic fare collection system. Passengers purchase a fare card of the desired value (the maximum value available is $20.00) from vending machines located in each station and insert the card into a turnstile which records the passenger's location each time he or she enters and exits from the system. The cost of each trip from origin to destination is electronically calculated and subtracted from the value of the card.

Currently, the peak-hour fare is $.60 for the first 3 composite miles and $.125 for each additional composite mile (see Table 2-5). (A composite mile is the average of the airline distance and the rail distance between a pair of stations.) The off-peak fare is a flat rate of $.60 regardless of distance. As previously indicated, to transfer from Metrorail to

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*Ibid.

TABLE 2-4. METROBUS FARE TABLE

Location	Peak Fare*	Off-Peak Fare
Within D.C.	.60	.60
Within Maryland		
1 zone	.60	.60
2 zones	.60	.60
Within Virginia		
1 zone	.60	.60
2 zones	.85	.60
3 zones	$1.10	.60
4 zones	$1.35	.60
Crossing D.C.-Maryland Zone Boundary an additional	.50	.25
Crossing D.C.-Virginia Zone Boundary an additional	.60	.60
Handicapped and Senior Citizen Reduced Fare		
Within D.C.	.20	
Within Virginia and Maryland	.30	
Between D.C. and Maryland	.50	
Between D.C. and Virginia	.50	

(Fares valid at all times; special ID card required)

*Peak hours: 6:00 to 9:30 a.m. and 3:00 to 6:30 p.m. weekdays (except national holidays).

Figure 2-3

METROBUS FARE ZONES

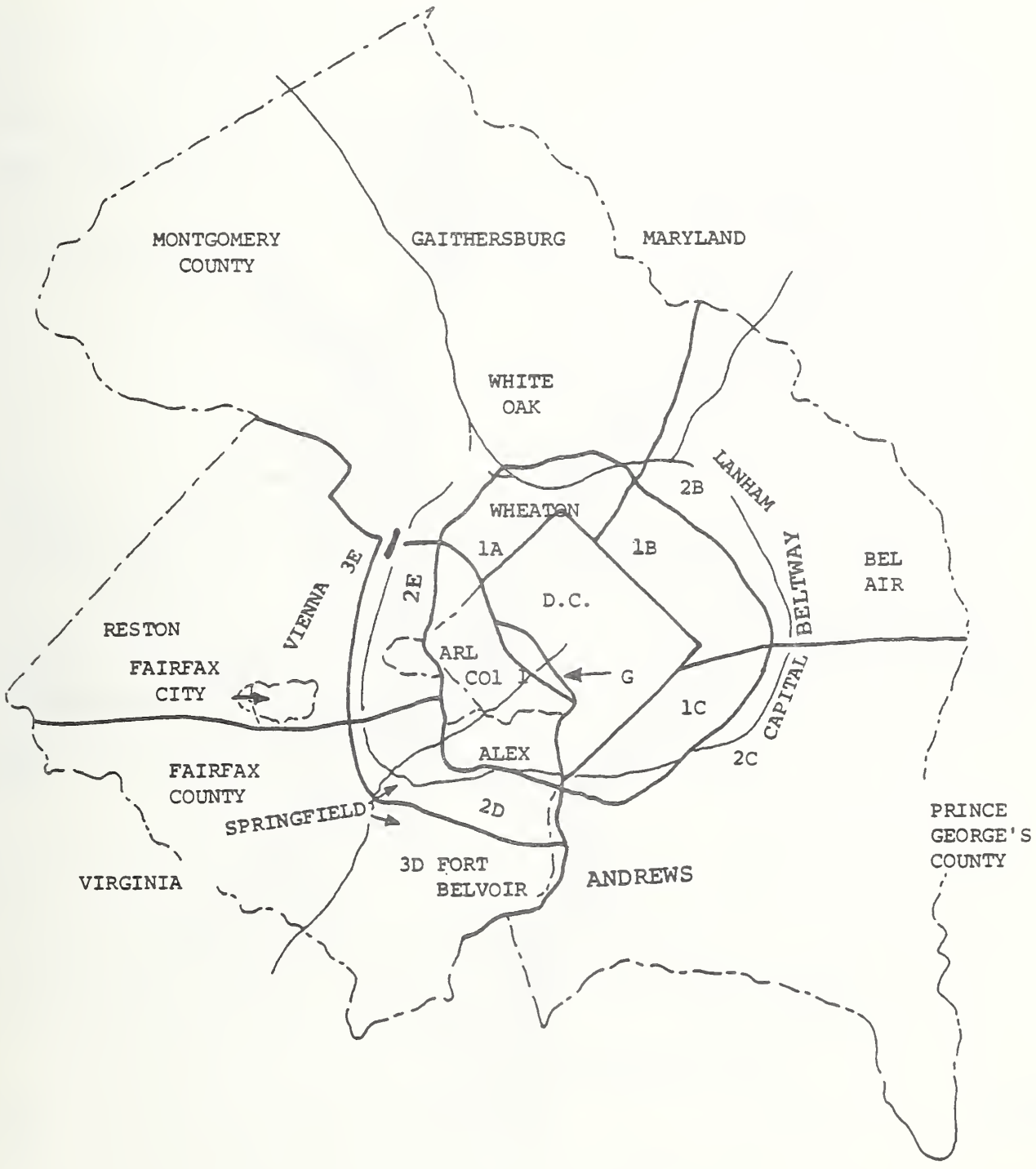

Figure 2-4

THE METRORAIL SYSTEM AS OF DECEMBER, 1981

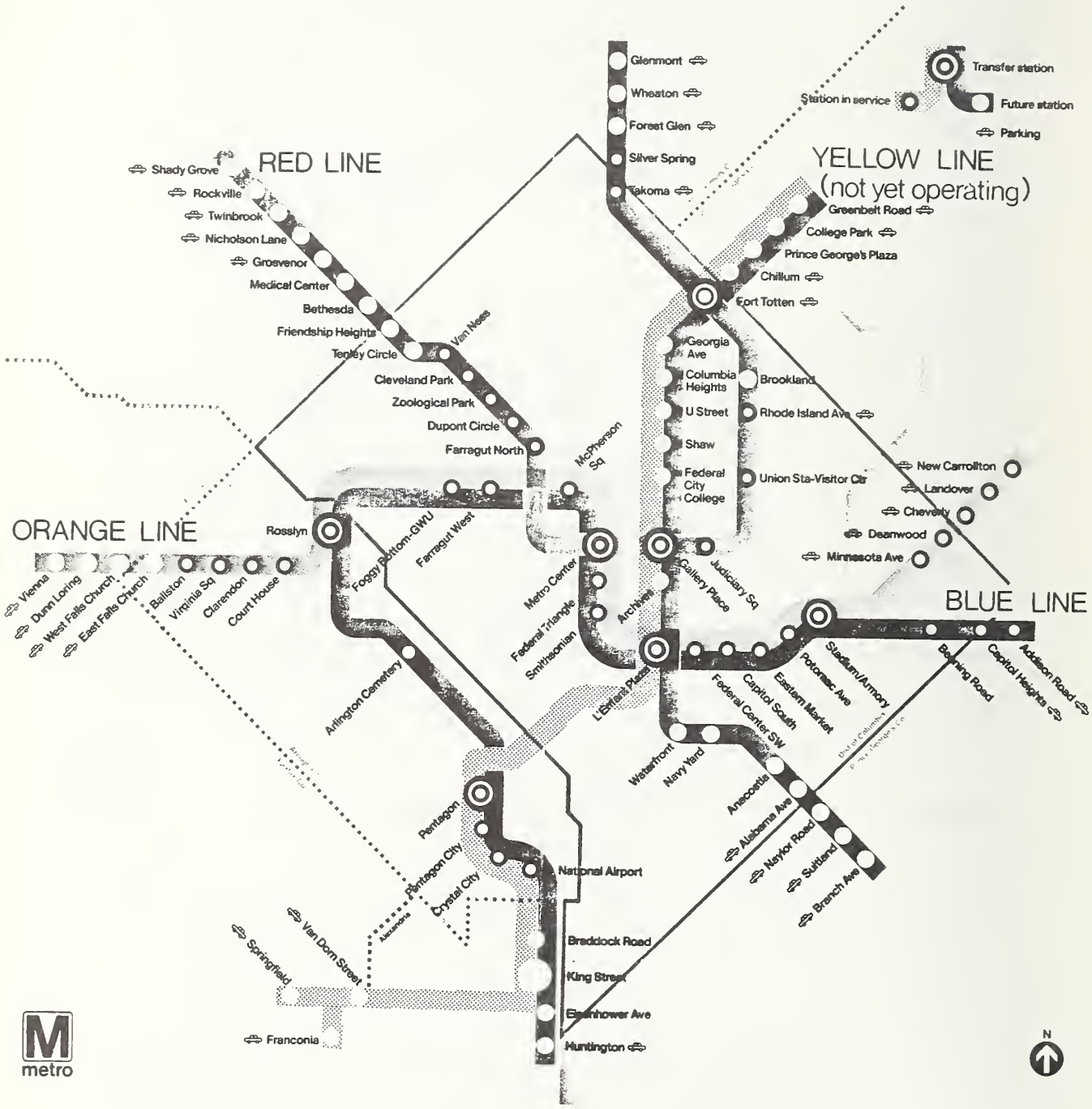

TABLE 2-5. METRORAIL FARE TABLE

Peak: .60 for the first 3 composite miles
.125 each additional composite mile

Off Peak: .60 any distance

Handicapped and Senior Citizen Reduced Fare: ½ Peak Hour Fare to .60 maximum

Rail to Bus Transfers (applicable Metrobus zone and border charges are additional):

	Handicapped and Senior Citizens	All Others
D.C.	Free	Free
Maryland	.10	.25
Virginia	.15	.35

the Metrobus system, riders use transfer tickets available from dispensing machines in each rail station; similar transfers from bus to rail are not possible because of Metrorail's farecard system.

As with Metrobus, senior citizens (65 years and older) and handicapped persons are eligible to ride Metrorail at reduced fares. However, the elderly and handicapped must obtain a special farecard which is available only at specific sales outlets (rather than at station vending machines). Special cards are also necessary for their attendants, who may also ride for half fare when accompanying a handicapped person.

In accordance with federal policy (see Section 2.1) Metrorail was constructed as a fully accessible system. Elevators are currently provided at all stations for use by passengers who have difficulty using the escalators or stairs between the street and the subway platform. In addition, the District of Columbia has installed curb cuts at all intersections within a quarter of a mile of each Metrorail station. The majority of Metrorail stations are served by at least one accessible route.

During FY 1981, the number of average weekday trips by Metrorail was about 279,674, or about 76 million trips for the year. With a total operating cost of $94.4 million and revenues of $56.4 million, the cost per passenger in FY 1981 was $1.13 with cost recovery from the farebox about 60%.*

2.2.1.3 Taxi Service - Taxi service in the District of Columbia is provided by 57 companies operating a total fleet of 7876 vehicles. Regulations permit shared-riding at the discretion of the taxi driver. In shared-ride service, passengers pay separate fares based on individual origins and destinations. All fares within the District of Columbia are based on a zonal system; the cost is $1.55 for travel in one zone, and 70¢ for each additional zone. For group riding, the charge is the zone rate plus 75¢ for each additional passenger. When engaged in interstate service, District cab companies charge on a per mile basis with $1.00 for the first mile, 45¢ for each additional 1/2 mile and 75¢ per additional passenger.

Taxi companies in other jurisdictions in the metropolitan area are subject to local regulations concerning shared-riding, group riding and other operations. A large number of companies provide service in suburban Maryland and Virgina, primarily with meter cabs. Many localities have special fare provisions that benefit elderly and/or handicapped passengers. For example, Montgomery County, Maryland does not charge for accompanying attendants, additional passengers age 60 or over, and licensed guide dogs, and suspends its 50¢ personal service charge for those who are blind or in a wheelchair. Similarly, Prince George's County, Maryland does not charge for an extra passenger if that passenger is elderly, and does not have a charge for personal assistance. Taxi rates vary widely for the first mile ($1.90 in Montgomery County as compared with $1.50 in Prince George's County) while each succeeding mile is 90¢-$1.00. Rates for additional passengers are generally 50¢-60¢, but they may be as high as $1.00 (Alexandria, Virginia).

No major taxi operators specialize in elderly or handicapped services, although some special arrangements exist between private operators and local agencies. For example, the American Cancer Society provides taxi service for cancer patients for medical purposes. Many taxi operators will arrange for their drivers to assist elderly and handicapped travelers if they are notified of passenger needs in advance.

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*WMATA, Office of Financial and Policy Planning.

In general, taxi rates in the Washington metropolitan area are low in comparison with some other major urban areas.

2.2.2 Special Transportation Services

In the mid-1970's, the Metropolitan Washington Council of Governments began compiling a comprehensive listing of special transportation services provided by public, private non-profit, volunteer, private for profit and educational organizations in the Washington, D.C. metropolitan area. The most recent directory update (March 1981) shows that in 1980 149 organizations were providing service (see Table 2-6). This represents a startling increase in service providers of more than 50% since 1977, a period that includes about the first 18 months of the demonstration. Private non-profit organizations still account for nearly two-thirds of all providers while another 22% are public agencies.

As Table 2-7 shows, the total number of vehicles operated by special transportation providers has increased even more than the number of agencies, by about 75%. Organizations may have sedans, vans, minibuses or full size buses, which may or may not be accessible (i.e., lift or ramp-equipped). Eleven to 15-passenger capacity vehicles are most prevalent. However, despite the increase in the number of service agencies and the expansion of the vehicle fleet, the total number of passengers served has increased only slightly by comparison (see Table 2-8). One source suggested that inefficient vehicle utilization and lack of sufficient operating funds has prevented agencies from increasing their ridership, despite an apparently high level of demand.* While a majority of the passengers who are served are elderly, there are still a substantial number of agencies which serve handicapped clients.

Eligibility for agency services is generally on a categorical basis, depending upon age, specific disability, income and/or residential location. Specific criteria will vary according to the nature of the agency and its funding source. Service is generally free, although occasionally a nominal amount (e.g., 40¢) is charged or a donation is requested. Advance trip reservations of a day or more are frequently required.

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*Nancy Smith, Northern Virginia Planning District Commission. The Commission has just completed an in-depth study of elderly and handicapped transportation service providers in the Northern Virginia area.

TABLE 2-6. ORGANIZATIONS PROVIDING SPECIALIZED TRANSPORTATION SERVICES

Jurisdiction	Organization Type: Public		Private Non-profit		Private For-Profit		Educational		Public Transportation		Total	
	1977	1980	1977	1980	1977	1980	1977	1980	1977	1980	1977	1980
District of Columbia	5	4	16	28	3	10*	4	4	0	0	28	46
Alexandria	1	3	3	7	0	0	1	0	0	0	5	10
Falls Church	0	0**	3	2**	0	0**	0	0	0	0	3	2
Arlington Co.	3	3	3	4	0	0	0	0	0	0	6	7
Fairfax Co.	1	7	7	16	0	1**	0	0	2	0	10	24
Loudoun Co.	2	6	7	6	0	1	0	0	0	0	9	13
Prince William Co.	2	3	3	5	0	1***	0	0	0	0	5	9
Montgomery Co.	1	2	16	16	1	2+	0	0	3	2	21	22
Prince Georges Co.	2	5	3	8	0	1	1	1	0	1	6	16
TOTAL	17	33	61	92	4	16	6	5	5	3	93	149

*Most licensed for transportation of Medicare and Medical recipients
**May also be served by Fairfax Co. organizations.
***Will serve other Virginia locations.
+Will also serve Prince George's Co.

Sources: WashCOG, in March Battle Associates, Transportation for Elderly and Handicapped Persons in the Washington Area, October 1978.

WashCOG, Directory of Special Transportation Services, March 1981.

TABLE 2-7. SPECIAL TRANSPORTATION VEHICLE SUPPLY BY CAPACITY

Capacity	Number of Vehicles 1977	1980
1-5	31	29
6-10	74	91
11-15	136	154
16-20	22	52
21-25	17	22
26-30	0	1
30+	62	41
Unknown	-	211
TOTAL	342	601*

*This table does not include volunteer vehicles or vehicles operated by local government public transportation agencies.

Sources: WashCOG in Mark Battle Associates, Transportation for Elderly and Handicapped Persons in the Washington Metropolitan Area, October. 1978.

WashCOG, Directory of Special Transportation Services, March 1981.

TABLE 2-8. DAILY RIDERSHIP ON SPECIAL TRANSPORTATION

Jurisdiction	Daily Passengers 1977	1980
District of Columbia	2,945	4,368
Alexandria	147	428
Falls Church	58	34
Arlington Co.	83	226
Fairfax Co.	210	1,526
Loudoun Co.	78	439
Prince William Co.	113	225
Montgomery Co.	1,224	962
Prince George's Co.	3,471	942
TOTAL	8,329	9,150*

*Actual total is somewhat higher; a number of agencies did not report ridership figures.

For-profit providers (with the exception of the District of Columbia Medicare/Medicaid providers) generally have no eligibility requirements and serve wider geographic areas. However, the cost of a one-way trip may be $25.00 or more. These operators also prefer 24-hour advance notice.

2.3 SUMMARY

The Washington D.C. metropolitan area incorporates a number of jurisdictions, encompassing both dense urban, suburban and rural areas. Compared with national figures, the SMSA population as a whole is extremely affluent, with a higher than average level of government employment and a lower than average unemployment level. The area has a comprehensive public transit network that includes both an extensive bus system and a fully accessible rapid rail service. Public transportation is also provided by a large number of taxi operators at fares which are generally lower than those in many other large metropolitan areas.

According to 1980 census figures, the proportion of elderly in the Washington area is substantially below that of the nation as a whole. The incidence of handicapped individuals in the population appears to be close to the national average, although statistics on this group are much less recent. The elderly and handicapped may ride for half fare on the bus and subway system (with special I.D. cards), and may also take advantage of special discounts offered by taxi operations in some locations. Finally, transportation services are available to this group through a wide variety of publicly and privately funded human service organizations located throughout the area, however these typically limit inter-jurisdictional travel.

3. PLANNING, IMPLEMENTATION AND OPERATIONS

This chapter documents service planning, implementation, and operation to provide a background for evaluating the results of the demonstration and to illustrate problems that may arise in applying the service concept elsewhere. This report does not, however, evaluate the effectiveness of the planning and implementation strategy nor does it propose a plan for other demonstrations.

3.1 PLANNING

3.1.1 Development of the Service Concept

WMATA developed its proposal to equip buses with lifts largely in response to federal "special efforts" requirements. UMTA did not specify a specific program design but outlined examples of actions which would meet the requirements, as paraphrased below:

1. commit an average of 5% of Section 5 funding to special services (e.g., dial-a-ride) for wheelchair users and semi-ambulatory handicapped;

2. provide a system of any design (possibly a user-side subsidy) which assures every wheelchair-user or semi-ambulatory person in the area at least ten round-trips per week at fares similar to those on standard buses; or

3. purchase only wheelchair-accessible buses until one-half of the fleet is accessible (or provide a substitute service that would provide comparable coverage and service levels).

Because the first alternative would have required introducing a new service and new equipment and the second was potentially very costly, the third alternative was chosen. It should also be noted that advocates of the elderly and handicapped testified before WMATA's Board in favor of the lift proposal.

A decision was reached at WMATA on August 25, 1977 to include purchase of lifts in the grant application covering bus purchases for Fiscal Year 1978. The application covered 261 40-foot Flxible buses, of which 130 would have factory-installed lifts (plus one extra lift for retrofit) and the remainder would be designed for retrofit at a later date (after WMATA had obtained experience with the lift equipment). Twenty 31-foot lift equipped buses were also purchased for the downtown circulator service. Delivery of the buses began during the fall of 1978, a few months after a demonstration grant application was submitted to UMTA calling for funds to carry out training of drivers, market the service and evaluate its impacts.

WashCOG conducted a study of elderly and handicapped transportation needs during the same period. The recommendations of that study were included in a final report issued in October 1978, entitled, Transportation for Elderly and Handicapped Persons in the Washington Metropolitan Area. The study proposed the following seven elements as part of a program to improve service to the elderly and handicapped:

1. Central Information and Referral Program
2. Advance Reservation and Subscription Service
3. Modifications of Existing Metrobuses
4. Special Systems for Nonambulatory
5. Taxi Services
6. Car Pool/Van Pool Alternatives
7. Purchase of New Buses with Lifts and Ramps

Elements C and G related specifically to the project service concept. Under Element C various modifications to existing buses were proposed. However, retrofitting existing Metrobuses for fully accessible fixed-route, line-haul services was not recommended, since it was felt that long distances required to access the routes and necessary transfers would discourage use of the Metrobus system by handicapped persons. The issue of transfers gains particular significance when one considers that WMATA has been rerouting Metrobuses to serve as feeders to Metrorail. Consequently, many more individuals may need to transfer vehicles during their trip.

The report did recommend that a number of other improvements be made:

1. Continued aggressive promotion of curb cuts and bus stop shelters (existing WMAT programs);

2. Larger, more obvious bus stop signs;

3. Internal and external loudspeakers and driver announcements;

4. Route markers (if not terminal information) presented at or near eye level adjacent to the forward entry door;

5. Location of additional stanchions and handgrips internally within the vehicle, facilitating internal movement;

6. Individual route maps in Braille to benefit the sight impaired;

7. Enforcement procedures for reserved seats; and

8. A policy to allow all elderly and handicapped riders to be seated, upon request, before the bus starts.

However, few of the recommended improvements came to pass.

The study also recommended that a final decision on retrofitting be made after the accessible bus demonstration project was evaluated, and it made some suggestions concerning certain aspects of project design, including frequency of lift service, data recording, publicity efforts and coordination with the proposed Central Information and Referral Service. Some of these suggestions were subsequently incorporated into the project.

3.1.2 Institutional Arrangements/Interest Groups

A number of governmental and private organizations and interest groups had important roles in the planning and development of the demonstration. These included:

1. WMATA
2. George Washington University
3. Metropolitan Washington Council of Governments (WashCOG)
4. local governments
5. local human service agencies
6. representatives of the disabled community

As the operator of bus and rail transit service in the area and one of the two UMTA demonstration grant recipients, WMATA played the central role. The Office of Financial Planning (recently reorganized as the Office of Planning and Development) had ultimate responsibility for planning and supervising the project and hired a Lift-Bus Project Coordinator. The Office of Bus Services, however, had responsibility for maintaining equipment and operating the service itself.

George Washington University's Rehabilitation Research and Training Center (GWURTC/RT-9), as the other UMTA grant recipient, prepared, conducted and evaluated various training activities. The Center, sponsored by George Washington University and by the Rehabilitation Services Administration (RSA) of the U.S. Department of Health and Human Services (DHHS), has as its primary purpose medical research and training related to the needs of the handicapped and dissemination of its findings. A Regional Advisory Council comprised of service providers, consumers, university faculty and RSA officials guides the staff. For the purposes of the demonstration a 9-member voluntary Special Advisory Committee was also established, composed of transportation providers, consumers and rehabilitation professionals interested in the transportation needs of the handicapped.

The Metropolitan Washington Council of Governments (WashCOG) is the metropolitan planning organization (MPO) for the region and is responsible for preparing the transit improvement program (TIP) and its annual elements. WashCOG completed a study of the transportation needs of the elderly and handicapped in October 1978 which outlined activities designed to increase the mobility of these population segments. Among these was the purchase of accessible buses.

Since the availability of curb cuts (wheelchair ramps) is an important element in fixed-route transit system accessibility, but is not under WMATA's control, coordination with the various local jurisdictions was necessary. The District of Columbia has a high percentage of intersections with curb cuts, including well over half of downtown intersections, and has an ongoing program to insure their availability within four blocks of all Metro stations. No such special program to insure curb cuts at bus stop intersections is underway, although all street resurfacing and reconstruction projects incorporate curb cuts. All of the surrounding counties also offered to construct some curb cuts in conjunction with the project; Montgomery and Prince George's County in Maryland agreed to respond to individuals' requests for curb cuts.

Various human service agencies were also involved in planning for the accessible bus project. Agencies were generally supportive of the project and quite interested in field demonstrations of the lift vehicles and training of the handicapped. WMATA had informal discussions with a few agencies which provide transportation about utilizing their vehicles in a feeder capacity; these agencies were generally receptive to the idea. However, nothing was done to follow-up on this idea. WMATA's Section 504 transition plan filed in December 1980 included feeder service to Metrobus using WMATA-provided vehicles as one

of the door-to-door options, but this option was not chosen by the advisory committee.

Agencies did assist WMATA in a survey effort by distributing mailback survey forms to their clients to provide WMATA with information on the location and needs of the handicapped. These data were used in planning consumer training and field demonstrations (although they were insufficient for use in route selection, the other original purpose behind the survey). In the future, several agencies plan to play a key role in training the handicapped to use transit, since during the demonstration rehabilitation professionals were trained by GWURTC staff to carry out lift-bus use training as part of "skills of daily living" rehabilitation programs.

The disabled in the D.C. area are a vocal group. Representatives of the disabled as well as rehabilitation professionals served on informal advisory planning committees assembled at WMATA since 1977 and on GWURTC's special advisory committee for the project. Disabled volunteers helped test the service during a trial period in April; this trial was planned with some assistance from a representative of the National Paraplegic Foundation. A permanent advisory committee was formed once the project was underway to monitor progress, improve services and assist in Section 504 transition planning for the entire transit system.

3.1.3 Identifying the Handicapped Market and Selection of Routes

An Ad Hoc Advisory Committee of Handicapped Individuals assisted WMATA in the design of the accessible service. Several alternative routing concepts were discussed and it was decided that no special routes would be devised, but that several existing major routes that serve key travel generators and Metrorail stations would be selected for accessible service. To help determine which routes should have priority, WMATA conducted a post card mailback survey which identified the origins, destinations and travel needs of the handicapped population (see Figure 3-1). About 2300 surveys were distributed, largely through human service agencies (some of which reprinted the form in their newsletters). However, only 200 completed surveys were returned, and there were not sufficient data for use in route planning. (The survey results were used instead to arrange for planning consumer training.) WMATA subsequently decided to implement service in each of the major corridors utilizing approximately 80 of the lift-equipped buses. From the outset, a small number of buses were reserved to fill gaps in service identified by consumers once service

Figure 3-1

METRO WHEELCHAIR USER SURVEY

metro

WHEELCHAIR USER SURVEY

Within a few months Metro will begin operating Metrobuses equipped with wheelchair lifts and other special features which will make it easier for handicapped people to use public transit. Persons who travel in wheelchairs will be encouraged to use the Metrobuses with wheelchair lifts. We are planning to send a Metrobus and instructor into neighborhoods where people in wheelchairs can practice using the lifts. We want to know where you live so that we can plan the routes. We also need to know where you would like to go if you could use our Metrobuses. You can help us by filling out and returning this questionnaire. Thank you!

Sincerely,

Theodore C. Lutz
General Manager

QUESTIONNAIRE FOR WHEELCHAIR USERS

A - All Metro stations have elevators so persons in wheelchairs can get to the platform where they can board the trains.
Have you **ever** used the Metro in your wheelchair?

☐ Yes ☐ No

B - As a wheelchair user, do you **ever** ride a Metro*bus*? (Check one):

☐ I never ride Metrobuses
☐ I ride a Metrobus less than once a month
☐ I ride a Metrobus once or twice a month
☐ I ride a Metrobus one or more times a week

C - Metro will soon operate buses with wheelchair-lifts. **Would you like to learn how to use the wheelchair lift if a bus and instructor came to your neighborhood?**

☐ Yes ☐ No

D - If you could use a Metrobus with wheelchair lift, name three places you would like to go and indicate trip purpose and time of day:

1 _____ _____ _____

2 _____ _____ _____

3 _____ _____ _____
STREET AND NO. CITY, STATE, ZIP — PURPOSE — TIME OF DAY

E - How do you usually make trips now? (Check **ONLY** two modes you use most often):

☐ I drive a car
☐ I am a car passenger
☐ I am a taxi passenger
☐ I ride Metrorail
☐ I ride Metrobus
☐ I ride other buses (such as Ride-On or Reston buses)
☐ I use another kind of transportation (explain):

_____

F - How many trips do you usually make away from your home each week? (Circle one):

0 1 2 3 4 5 6 or more

G - If you learn how to use the buses with wheelchair lifts, do you think you will use them? (Check all answers that apply to you):

☐ Yes, I will expect to use the lift buses.
☐ Yes, if someone can go with me (I need help when I travel).
☐ Yes, if I can get back and forth between my home and the bus stop.
☐ No, because I don't think I can get between my home and bus stop.
☐ No, I am not well enough to travel by bus.
☐ No, I don't want to go anywhere.
☐ Other problem? (Explain): _____

_____

H - Metro issues identification cards (I-D cards) to handicapped persons which entitle the holders to fare discounts for trips on Metrobuses or Metrorail. **Do you have a Metro I-D card?**

☐ Yes ☐ No

(If you do not have a Metro I-D card, and would like to have one, please call Metro at 637-1246.)

J - Please list a telephone number where Metro can call you, and write down a mailing address so that we can keep you informed about Metro's special services:

_____
PHONE NO — STREET AND NUMBER — CITY, STATE, ZIP

K - Comments?

PLEASE RETURN THIS QUESTIONNAIRE WHEN YOU HAVE COMPLETED IT - NO POSTAGE NEEDED
THANK YOU FOR YOUR HELP

was initiated. (This was, of course, in addition to a large reserve fleet to be used to maintain service reliability.)

Several criteria were used to select routes for lift-bus services:

1. Both radial and cross-county service were to be provided.

2. Environments were to be barrier free.

3. Service was to be provided to fringe parking lots and to key travel generators such as shopping malls and medical facilities.

4. Service was to be provided to meet the needs of the particular wheelchair lift-users who participated in the trial-service.

3.1.4 Key Concerns Addressed in the Planning Process

A number of difficulties that might have occurred during the project period were identified during the planning process and strategies were proposed to deal with them. For example, there was concern that drivers might be unwilling to provide the necessary assistance to lift-users and that their unions (the Amalgamated Transit Union and the International Brotherhood of Teamsters) would request extra pay for lift operation and assistance to passengers. WMATA attempted to avoid such problems by involving the drivers' unions in early stages of the project and conducting sensitivity training for operators. The result was that drivers and their unions were largely cooperative. Three-year contracts between each union and WMATA expired in the spring of 1980, but no issues related to the project were reportedly raised in the negotiations for the new contracts. Nevertheless, many drivers did not know how to operate the lift and on occasion denied service to waiting passengers.

It was anticipated that several problems could arise which would hinder ridership including lack of curb cuts, lack of lift-bus availability, and lack of encouragement from human services agency staff. To overcome insufficient curb cuts, WMATA left open to consideration moving some bus stops to more accessible locations and instructed drivers to allow disabled passengers to board and alight outside the designated bus stops if necessary. To insure vehicle availability, WMATA planned to start service with only a portion of the vehicles, reserving a significant portion for use as spares. Finally, WMATA communicated with agencies over the course of the project to obtain

their support. This support was enlisted in the effort to conduct field demonstrations of the vehicles and in GWU's program of training for rehabilitation and allied health personnel. While all of the above was aimed at increasing ridership, in fact, no bus stops were moved due to a lack of specific requests, service reliability was poor and agencies took a minimal role, possibly contributing to the low ridership which resulted.

Other anticipated problems included those which would result if demand was high, such as requests for service on additional routes and wheelchair passengers waiting for buses whose tiedown locations were already occupied. To be able to accommodate requests for additional service, WMATA reserved a small number of lift vehicles, in addition to its reserve of spares, to be used to add service at a later date. While some such service additions took place, the lift-bus availability problem prevented continuing expansion of service. To handle cases of overcapacity, WMATA instructed drivers to stop and inform wheelchair passengers of the next scheduled accessible trip. In addition, drivers of non-accessible trips were asked to accommodate passengers if their bus was lift-equipped, and street supervisors were available to help under extenuating circumstances. However, ridership was sufficently low that these problems were very rare.

Finally, there was concern about potential delays. To gather experience in dealing with wheelchair passengers and any potential delays, a trial service was operated. Procedures were refined during this period and it was decided that schedules need not be changed to accommodate the wheelchair passengers. Nevertheless, other riders reported that there were substantial delays due to lift boardings.

3.2 THE PROCESS OF IMPLEMENTING ACCESSIBLE SERVICE

Following the end of the planning process, a series of implementation related activities were undertaken. Note that several of these continued throughout the operations period. The actual timetable of activities is indicated in Figure 3-2. The major steps included:

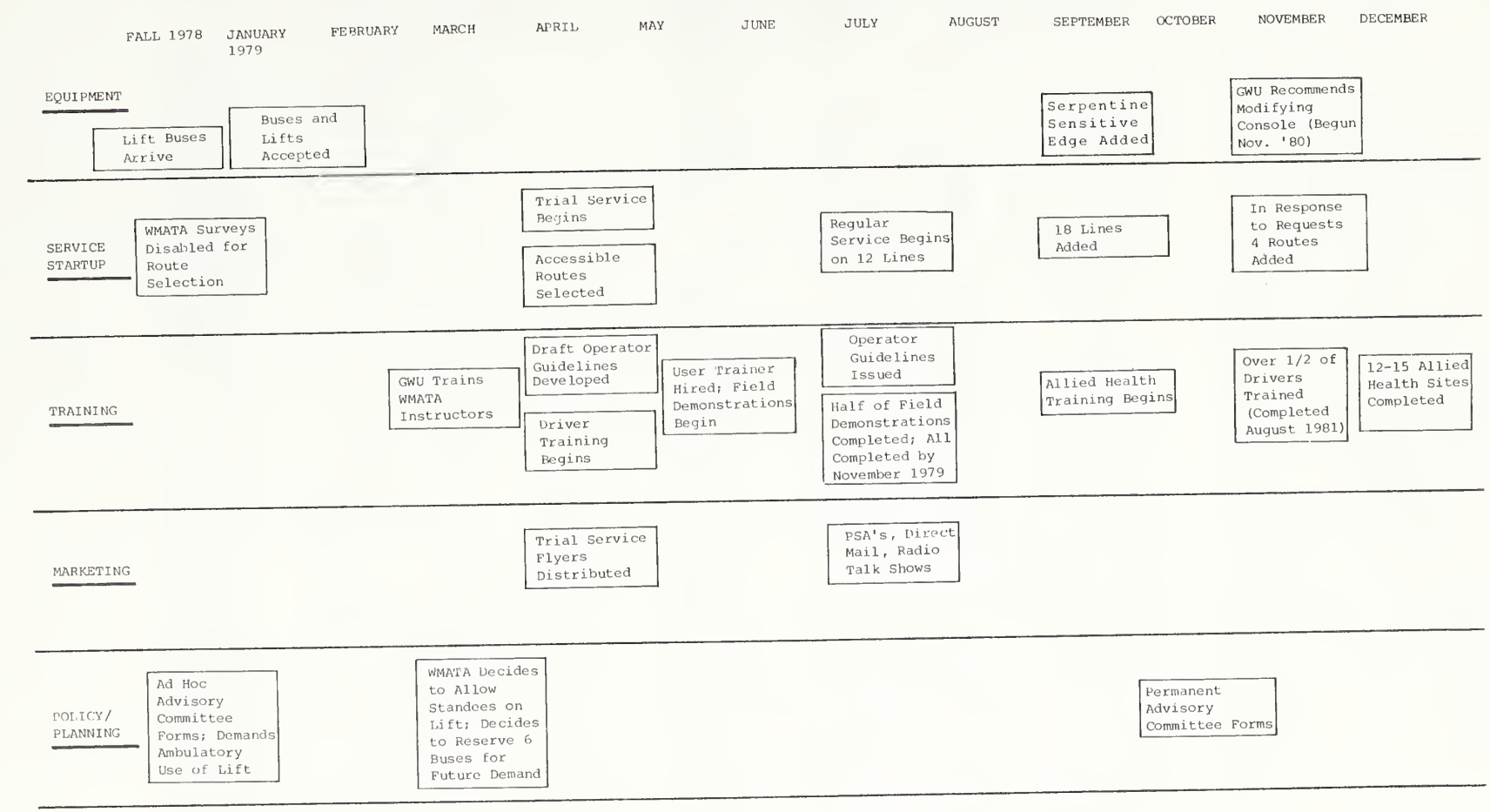
1. equipment testing;

2. evaluation of possible engineering improvements to the equipment;

3. training driver instructors and drivers;

Figure 3-2

IMPLEMENTATION SCHEDULE



4. service trial;

5. production and placement/distribution of marketing materials;

6. field demonstrations of lift equipment;

7. training of rehabilitation professionals; and

8. service start-up.

These activities are discussed below.

3.2.1 Equipment Testing*

WMATA purchased 130 Flxible buses with factory installed Travelifts (plus one extra lift - later retrofitted), manufactured by the Vapor Corporation of Chicago. In addition to the lifts, Flxible installed tiedown equipment to secure wheelchair-confined passengers while on the bus. Each bus was supplied with two wheelchair locations, consisting of a flip-up seat with an extension arm that can be hooked onto the wheelchair, and a "modesty panel" with an attached safety belt that wraps around the passenger. In preparation for the start of accessible service, WMATA "broke-in" the buses by running them in regular service (without lift operation) beginning in January 1979.

Modifications to the equipment were subsequently made by the bus manufacturer to correct deficiencies discovered by WMATA (and Milwaukee Transit). These included changes to the sensitive edge of the lift platform.

3.2.2 Engineering Evaluation

A special evaluation of the equipment design, which focused on human engineering, was performed under GWU's UMTA grant. Its primary objective was to "identify features of the bus equipment, both new and standard, that would limit access to the bus by persons with various mobility impairments, and/or those features that would produce potentially unsafe conditions when used."** The secondary objective was to suggest solutions to these obstacles.

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*Lift specifications are provided in Chapter 4.

**K. Mallik, WMATA Lift-Equipped Kneeling Bus for Accessibility and Safety of Persons with Transportation Handicaps, The George Washington University, June 1981, p. 1.

Fifty-eight elderly and/or disabled persons assisted in the study, representing a varied group of ages, disabilities and use of aids. Data on their disabilities were collected during interviews, after which the volunteers were observed while boarding, riding and alighting the bus. Observations were recorded on a checklist of actions required to use the bus; separate forms were developed for wheelchair and ambulatory persons.

An analysis of the data by a team consisting of an occupational therapist, an engineer, an environmental accessibility consultant and a wheelchair user, identified the following major problems:

1. The steep slope of the ramp makes it difficult for wheelchair passengers to board, and causes the wheelchair to accelerate rapidly upon alighting. The short length of the endgate ramp is also inconvenient for ambulatory passengers who have difficulty stepping on or over it.

2. The control box used by the driver was not clearly labeled contributing to the likelihood of errors.

3. The 96 inch width of the bus is too narrow for easy passage through the aisle by wheelchair passengers and those using walkers or crutches. When the bus is crowded, it is difficult for other passengers to make room for a wheelchair passenger and difficult for drivers to be aware that a lift passenger wishes to alight. It was also estimated that 80% of manual wheelchair users and all power wheelchair users would have great difficulty maneuvering past the farebox.

4. The buzzer used by a disabled passenger to signal the driver is not distinctive; as a result, drivers are not always prepared to assist the disabled user in alighting.

Other difficulties encountered by users included reaching the seatbelt and the bell cord, lifting the jumpseat and adjusting the restraining arm. The effects of these problems on accessibility and user safety were assessed and recommendations were made to redesign the control box and the lift ramp, to educate lift-users about difficulties, and to establish policies for drivers to assist users. Several of these actions have been implemented. The driver control console was rewired to simplify the driver's operating procedure. WMATA modified policies to enable drivers to ride the lift with the passenger in order to provide assistance. In addition, WMATA plans to

purchase wider buses in the future. (Special waivers are needed to operate wider buses in the Commonwealth of Virginia.) Finally, use of the seatbelt was made optional; the padded arm restraint, of course, had to be used.

Several low-cost adaptive aids for the user were recommended. For example, a commercially-available device can be used to temporarily reduce the width of the wheelchair. Many other suggested aids would need to be specially manufactured.

3.2.3 Training Instructors and Drivers

GWURTC prepared and conducted a two and one-half day course of instruction in disability awareness for WMATA's 19 bus driver training instructors. Sessions took place in late March and early April 1979. WMATA instructors were then responsible for awareness training of the system's bus operators. The training was administered to bus operators beginning late April 1979 in 2½ hour sessions led by the instructors (although the first session was co-led by GWU staff). Participation in awareness training was voluntary; however, operators were not permitted to drive accessible runs without the training. Operators had some choice in whether to participate in the project as they chose their run assignment; these "picks" occur at least three times per year. The frequency of picks, and the resulting changes in assignments, have been cited as a factor preventing drivers from developing a rapport with lift-users. As of mid-January, 1981, 1½ years after service was initiated 1501 of WMATA's 2700 drivers has been trained. By the end of the demonstration period just about all remaining drivers had been trained.

The awareness training was designed to enable bus operators to develop an understanding of:

1. The constraining effects of handicaps in the economic and social environments;

2. The effects of specific types of handicaps on the ability of individuals to use mass transit;

3. The capabilities and limitations of the newly installed aids to improve the mobility of the handicapped; and

4. WMATA's obligations to the handicapped under Federal regulations.

Among the messages conveyed were that:

1. Disabilities happen to everyone.

2. Disabled people can overcome their disability by using aids.

3. Transportation is a right of disabled citizens, guaranteed by legislation.

4. Bus operators must overcome attitudinal barriers that interfere with communication and satisfactory job performance.

The key words stressed at the session were courtesy, communication, and common sense.

The session included two half-hour films: one to introduce bus operators to individuals with various disabilities ("Getting to Know You") and one to review procedures for boarding disabled passengers ("The Accessible Bus: Guidelines for the Operator"). Role playing with a question and answer period was used to illustrate several points during the discussion.

Drivers were provided with five booklets on "Barrier Awareness" developed by the GWU Regional Rehabilitiation Research Institute and one booklet on how to assist disabled or elderly passengers riding the accessible bus prepared by George Washington University staff specifically for this project. GWURTC evaluated the impact of the training programs, using an adaptation of the Attitudes Toward Disabled Persons (ATDP) Scale and the Disability Awareness Inventory (DAI) as instruments for evaluation. (The latter instrument was specially developed for the project.) GWURTC found significant increases in sensitivity and awareness among the driver instructors following the training session. A follow-up, 16 months later, showed that this increased level of awareness was sustained. A control group showed no significant pre- and post-test difference; however, after subsequent training they showed similar gains.

The awareness training of operators was evaluated both by pre- and post-testing of trained operators and by testing trained and untrained operators sampled while on standby duty in the ready rooms of seven of the eight garages. About 160 operators (10%) participated in each test. GWURTC found a significant increase in awareness after the training and found significant differences between trained and untrained operators both in awareness and impressions of the new lift-bus.

WMATA's instructors provided feedback to the evaluation of the training program. Specifically, they suggested that role-playing and interaction with consumers were most valuable and should be given more emphasis. They also indicated that more comprehensive audio-visual materials were needed and that the train-the-trainer program should include a segment on general training techniques, particularly if the instructors being trained had little previous training experience. Other WMATA staff indicated that the program was too lengthy and that the training films could be improved.

GWURTC concluded that the training program was successful in affecting both awareness and attitudes but that the two are somewhat independent. Annual refresher sessions, including direct contact with experienced consumers of the service, were considered to be advisable in order to sustain positive changes in attitude. To date, no formal program of refresher awareness training has been implemented.

In addition to the disability awareness training, WMATA also provided training in lift-operation to the bus operators in 20 minute sessions in the yards at the various division garages. These services covered the procedure for lowering and raising the lift, but did not cover passenger boarding procedures or include practice at a curbside. Some operators requested additional explanation of procedures on their own time. Refresher skills training is available and WMATA's trainers aim at annual retraining.

3.2.4 Service Trial

On April 2, 1979 WMATA began a test of the service on seven selected routes. A member of the National Paraplegic Foundation helped to plan this trial. A handful of disabled persons volunteered to ride these routes to help WMATA work out any remaining problems before actual service implementation in July. It was important to remind the volunteers of the benefit of their assistance as they encountered delays and other problems in using the service. The primary benefit of the trial service was to initiate operations on a small scale with a limited interface with the public. WMATA as an institution was thus able to gear up for service to a new market. While no formal evaluation took place and no major changes were made to procedures, informal surveys were carried out to determine whether public reaction would be significant.

3.2.5 Marketing

Limited marketing activities were funded by the demonstration. The marketing program was aimed at:

1. raising the general riding public's awareness of the disabled user; and

2. conveying specific information to disabled people to encourage their use of the service.

The program incorporated both media activities and field demonstrations. The latter were a specific item in the demonstration project plan and are discussed in Section 3.2.6.

Media activities included distribution of brochures, letters, and flyers, and broadcast of public service announcements heralding the availability of accessible service.

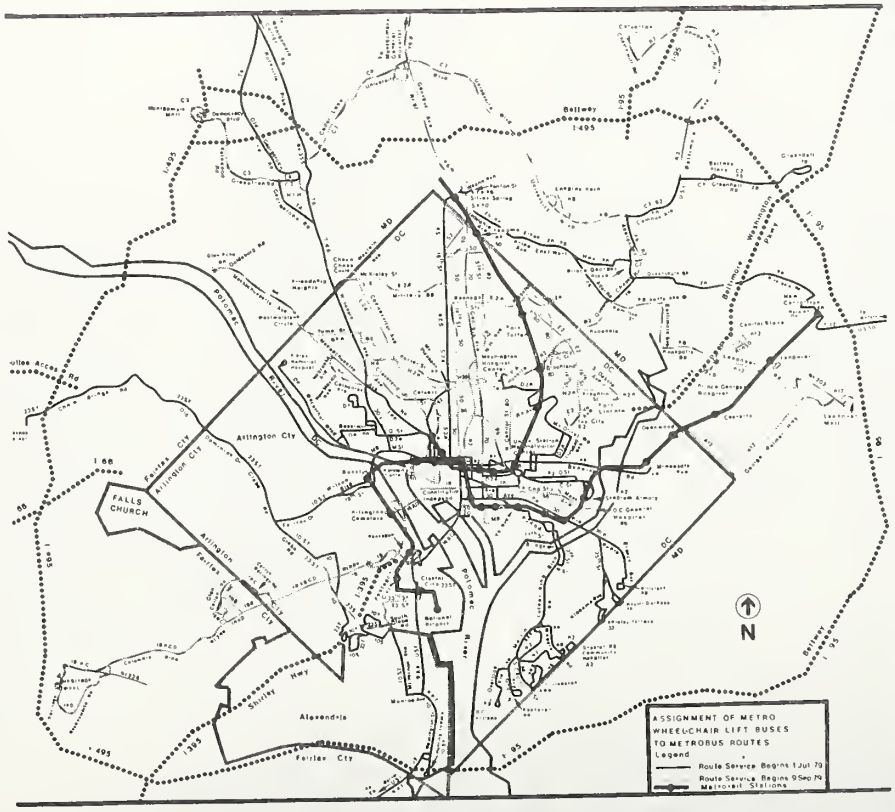
For the April trial service, flyers informing the riding public of the lift service were distributed on selected bus routes. Since the trial service involved a small group of volunteer riders and did not constitute service start-up for the public, no effort was made to advertise the service to the disabled population.

General promotion of the service began in July. Three 30-second public service announcements were prepared by WMATA's marketing staff and a private contractor for use by local television stations: one described the buses' kneeling feature; one described the lift, special seats and boarding procedures; and one aimed at the general public described the lift and asked for passengers' cooperation by letting the wheelchair passengers board first and by giving up their seat if needed. About $7000 in grant funds were used to prepare these spots, plus about $1000 of WMATA staff time. The spots started airing in June and were available for continued airing on an ongoing basis. The media were especially receptive to these ads and aired them frequently.

Several talk shows provided WMATA with an opportunity to explain the service to interested members of the audiences in greater detail. Also, WMATA printed 175,000 descriptive flyers which identified the accessible routes and listed telephone numbers to call: (1) to obtain timetables and reduced fare cards; and (2) to arrange for participation in community-based training (i.e., field demonstrations) (see Figure 3-3). These flyers were distributed to human service agencies who redistributed them.

Figure 3-3

METROBUS LIFT SERVICE FLYER



metrobus LIFT SERVICE

Beginning July 1, 1979 new lift bus service will operate on twelve Metrobus routes serving employment centers, hospitals, shopping and recreation centers in the Washington metropolitan area. In September, service will be expanded to an additional twenty routes (see map on reverse side).

If you can't climb steps, the lift bus kneels and makes climbing easier. If you're in a wheelchair, a platform lowers to the curb and lifts the wheelchair on the bus. Aboard the bus, the wheelchair locks into one of the two areas reserved for wheelchairs.

Traveling on Metrobus is now easier and more comfortable for the elderly and handicapped with Metro's new lift bus service.

ROUTES & SERVICE

ROUTE 9 -- FORT BELVOIR LINE
Serving Fort Belvoir, DeWitt Hospital, Mt. Vernon, Hunting Towers, downtown Alexandria, Crystal City, Pentagon, Bureau of Engraving and 10th & Pa.

ROUTE 10 -- ALEXANDRIA-ROSSLYN LINE
Serving Hunting Towers, Del Ray, Arlandria, Shirley Park, Shirlington, Westmont, Parkington, Virginia Square, Clarendon, Ft. Myer and Rosslyn Metro Station.

ROUTES 30, 32, 34, 36 -- PENNSYLVANIA AVENUE LINE
Serving Friendship Heights, Wisconsin Avenue, M Street, G.W. Hospital, Pennsylvania Avenue, 15th & Pa. S.E., Shipley Terrace, Naylor Gardens and Hillcrest.

ROUTE 40 -- MOUNT PLEASANT LINE
Serving Mount Pleasant, Union Station/Visitor Center, RFK Stadium, Stadium-Armory Metro Station and Seat Pleasant.

ROUTES A2, A4, A6, A8 -- ANACOSTIA-CONGRESS HEIGHTS LINE
Serving Greater Southeast Community Hospital, D.C. Village, Bellevue, Fort Drum, Livingston, Wheeler Rd. & Varney St., Federal Center SW Metro Station and 10th & Pa.

ROUTES D2, D4, D8 -- GLOVER PARK-TRINIDAD LINE
Serving Glover Park, Sibley Hospital, Trinidad, Ivy City, Rhode Island Ave. Metro Station and V.A. Hospital.

ROUTES F4, F6
Serving Silver Spring Metro Station, P.G. Plaza, East Pines, New Carrollton Metro Station, Maryland University, Beltway Plaza and Greenbelt.

ROUTE M6 -- M STREET-VISITOR CENTER LINE
Serving Rosslyn, Georgetown, Federal Triangle, Capitol Hill and Union Station/Visitor Center.

ROUTES S2, S4 -- 16TH STREET LINE
Serving Silver Spring Metro Station, 16th Street, Federal Triangle.

ROUTES T4, T6 -- BETHESDA-ROCKVILLE LINE
Serving Montgomery College, Rockville, Naval Medical, NIH, Bethesda, Friendship Heights and Dupont Circle.

ROUTE T17 -- JOHN HANSON HIGHWAY EXPRESS LINE
Serving Belair Center and New Carrollton Metro Station.

ROUTES X4, X6 -- BENNING LINE
Serving Minnesota Avenue Metro Station, Mayfair Gardens, 34th & Benning, Union Station/Visitor Center and Lafayette Square.

TIMETABLES:

Not every bus operating on the lift service routes will be a lift bus. Individual timetables for each route are marked with a "w" to indicate exactly what bus trips operate with lift-equipped buses.

To get the timetables you need, call our Timetables Office at 637-1261.

FARES

The elderly and handicapped ride Metrobus and Metrorail at reduced fare with proper identification. To find out how to obtain your identification card call:
637-1245 -- Handicapped Unit **637-1179** -- Senior Citizen Unit

TRAINING

Community based training on the lift bus equipment is available. Several areas throughout the metropolitan region have been selected for training sites. Wheelchair users who would like to take advantage of learning how to use the lift service before actually riding the bus can make arrangements for this special training by calling **637-1256**.

A special brochure was prepared describing how to use the accessible service, from obtaining information through boarding and alighting from the bus. WMATA printed 30,000 of these brochures. The brochures were distributed to advocacy groups for the disabled, and suggestions and comments were invited (see Figure 3-4). In addition, explanation of how to use the lift-buses was incorporated in a brochure about the reduced fare program for the elderly and handicapped (see Figure 3-5).

Revised timetables were printed which designated which trips were accessible (see Figure 3-6). Since the service is only partially accessible (i.e., only certain trips offer lift service), this element of the marketing program was very important for those disabled people who wanted to use the service. WMATA's system route maps also designated which routes offered lift service.

3.2.6 Field Demonstrations

The demonstration grant included funding for 30 field demonstrations of the lift-bus at accessible community sites. WMATA's Department of Transit Services was initially responsible for this program, while its Office of Community Services (now the Office of Public Affairs) handled program publicity. The demonstration program was later transferred to the Planning Office.

Initially, twenty-three sites were selected based on recommendations of local jurisdictions, the results of the mailback survey, geographical considerations, accessibility criteria, and the distribution of lift-bus routes. (The remaining seven field demonstrations were to be held at a later date based on demand generated by the service.) Sites included community centers, Metro stations, hospitals, schools, libraries, senior citizen housing, and rehabilitation centers. They were located throughout WMATA's service area as follows:

District of Columbia	5
Montgomery County, MD	4
Prince George's County, MD	4
Arlington County, VA	3
Fairfax County, VA	3
Alexandria, VA	2
Falls Church, VA	1
Fairfax City, VA	1

The demonstrations began in May 1979. The visits provided an opportunity for potential users to ride the lift under the direction of WMATA personnel, who also recorded information on observed difficulties. Each session lasted about 4 hours.

Figure 3-4

METROBUS LIFT SERVICE BROCHURE

Metrobus Lift Service

Traveling on Metrobus is now easier and more comfortable for the elderly and handicapped with Metro's new lift bus service. The new buses are equipped with platforms that lower to the curb and lift wheelchairs onto the bus. These special buses can carry two wheelchair passengers per bus.

Metro's new lift bus service operates on Metrobus routes serving employment centers, hospitals, schools, shopping and recreation centers in the Washington metropolitan area. Many of these routes also operate via Metrorail stations.

Your Metrobus operators are thoroughly trained in the mechanical operation of the lift equipment and in awareness of the needs of handicapped passengers. The operators provide any assistance or instructions you may need on boarding, securing yourself on the bus and leaving the bus.

How To Ride Metro's Lift Buses

What To Do First

Pick up the telephone and call our Transit Information Service at 637-2437 to make sure that the bus you plan to ride is equipped with the lift features you need. An information operator will be happy to provide you with any information you may need and even plan your trip for you. Just tell us where you are, where you want to go and what time you want to be there. Your Metro Information Operator will tell you where to catch your bus, the time it will arrive and when you will reach your destination. The Information Center is open every day from 6 a.m. to 11:30 p.m.

Metro's TTD (teletypewriter for the hearing impaired)—638-3780—is also open every day from 6 a.m. to 11:30 p.m.

Getting A Timetable

Not every bus operating on the lift service routes will be a lift bus. Individual timetables for each route are marked with a "w" to indicate exactly what bus trips operate with lift-equipped buses.

To get the timetables you need, call our Timetables Office at 637-1261 weekdays from 8:30 a.m. to 5 p.m.

Identifying Your Bus

Look for a bus with this symbol.

If you have difficulty climbing steps, this bus kneels for you and makes climbing easier. If you're in a wheelchair, a platform lowers to the curb and lifts you on the bus. Aboard the bus, the chair locks into one of the two wheelchair areas reserved for you.

Boarding The Bus

Wait at a bus stop for the bus. If there are several people waiting to board the bus at the stop, the lift user boards first.

If you are a wheelchair user, roll your chair either forward or backward on the lift. (It is easier to maneuver the wheelchair in the bus if you enter facing forward.)

Stop against the end gate and lock your chair. The end gate prevents your chair from rolling off the lift.

The platform then lifts you onto the bus. Anyone using the lift in a standing position should stand as close as possible to the inside edge of the lift to avoid being struck by the top of the bus doorway.

Deposit your fare in the farebox. A Metro Handicapped I.D. Card must be shown to ride at reduced fare.

Securing Your Wheelchair

Aboard the bus, the chair locks into one of the wheelchair areas reserved for you. Passengers seated on the fold-up benches are requested to give up their seats so that the wheelchairs can be secured safely.

Back your wheelchair into the position against the back barrier and lock your brakes.

Pull the lever toward you, releasing the padded safety arm. Pull the arm toward you so that it restrains your chair from moving forward or to the side. Be sure that the safety arm is locked by placing the lever in the center position.

To adjust the height of the safety arm, pull and hold the "T" shaped handle, adjust the arm to the desired position and release the "T" handle.

For maximum safety, fasten the seat belt (located on the back barrier) across your lap. Your bus operator will not move the bus until you are properly secured or seated.

Getting Off The Bus

As the bus approaches your stop, pull the cord found above the windows. This lets the operator know you want to get off at the next stop.

When the bus comes to a complete stop, move the lever all the way forward, push the safety arm away from you and release the seat belt.

Move to the front of the bus, wait until the lift and end gate are fully raised and roll your wheelchair onto the lift.

When the lift reaches the ground, the end gate lowers and you can move off the lift.

Fares

The elderly and handicapped ride Metrobus and Metrorail at reduced fare with proper identification. To find out how to obtain your identification call—

Handicapped Unit—637-1245
Senior Citizen Unit—637-1179

Let Us Hear From You

As an individual bus rider, you are our primary concern. We want to give you the best possible service and look forward to seeing you soon aboard one of our new lift buses. If you have any suggestions or comments concerning this new service, let us know by calling Consumer Assistance at 637-1328.

Metrobus—
Working harder to make it easier for you

Office of Marketing
600 Fifth Street, N.W.
Washington, D.C. 20001

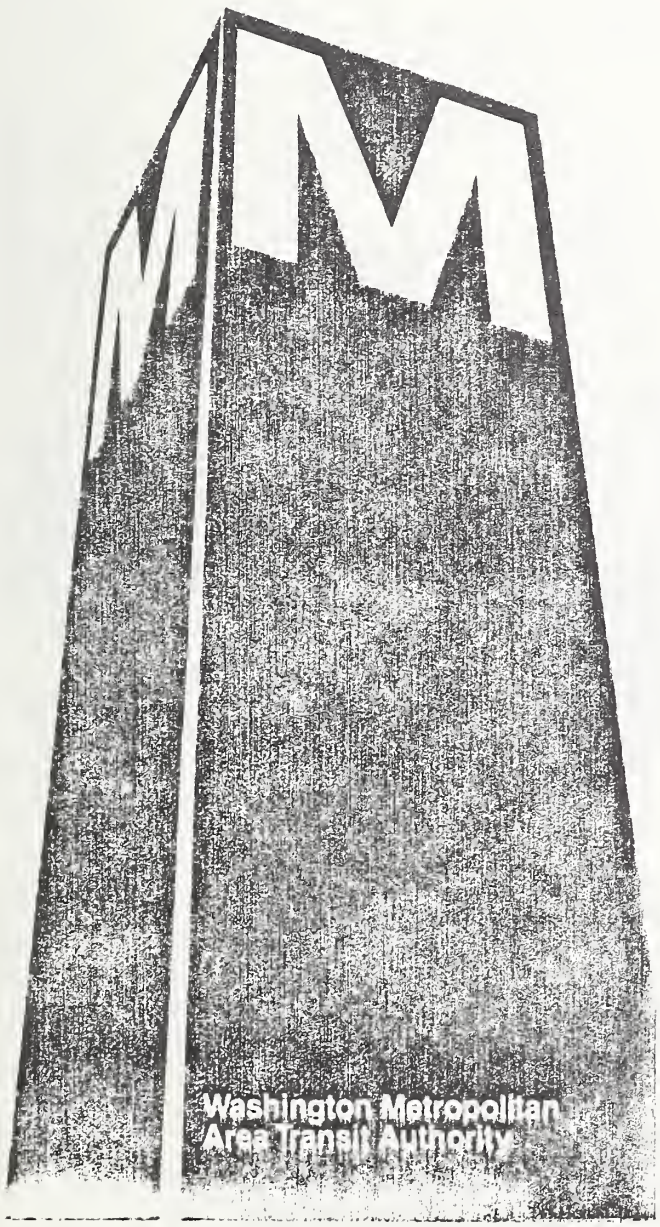
Figure 3-5

E & H REDUCED FARE PROGRAM BROCHURE

Facts

About metro's reduced fare program for senior citizens and handicapped

January 1981



How To Ride Metro's Lift Buses

Identifying the bus

Look for a bus with these symbols:

If you have difficulty climbing steps, this bus kneels for you and makes climbing easier.

If you're in a wheelchair, a platform lowers to the curb and lifts you on the bus. Aboard the bus, your chair locks into one of the two wheelchair slots reserved for you.

Boarding the bus

The lift user boards first when there are several people waiting to board the bus at the same stop. The bus operator will provide instructions to lift users and other passengers waiting to board the bus. Your Metrobus operator has been thoroughly trained in the mechanical operation of the lift equipment.

If you are a wheelchair user, roll your chair on the lift, stop against the end gate and lock your chair. The platform will then lift you onto the bus. Aboard the bus, the chair locks into one of the two wheelchairs areas reserved for you. Passengers seated on the fold-up benches are requested to give up their seats so that the wheelchairs can be secured safely.

As the bus is approaching your stop, pull the cord found above the windows. This lets the driver know you want to get off at the next stop. When the bus comes to a complete stop, wait until the other passengers get off. Then move to the front of the bus and roll your wheelchair onto the lift. When the lift reaches the ground, the end gate will lower and you can roll away from the lift.

Figure 3-6

METROBUS ROUTE SCHEDULE

ROUTE 19-G,Y

HUNTINGTON – WASHINGTON LINE

RUSH HOUR SERVICE ONLY

between

U.S. RT. 1 & HUNTINGTON AVE. (19G)

and

PENTAGON

10TH & PA. AVE., N.W.

between

HOFFMAN BLDG. (19Y)

and

PENTAGON

W – DESIGNATED TRIPS OPERATED WITH WHEELCHAIR LIFT EQUIPPED BUSES

metrobus schedule

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

metro

600 5th Street, N.W.

EFFECTIVE DATE APRIL 13, 1981

INFORMATION 637-2437

TO NATIONAL AIRPORT METRO STATION

ROUTE NUMBER	HANOVER AVE. & MONTICELLO BLVD.	ROSE HILL	MT. VERNON HOSPITAL	SOUTHGATE & TOWER DRS.	U.S. ROUTE 1 & KINGS HWY.	HUNTINGTON AVE. FRINGE PK. LOT	U.S. ROUTE 1 & FT. HUNT ROAD	HOFFMAN BUILDING	BELLE HAVEN & FT. HUNT ROADS	HUNTING TOWERS	WASHINGTON
11B	(Beacon Mall 6:03)	–		6:04			–		6:12	6:16	
11C	–	–	8:01	–	6:13	6:18	6:21	–	–		
11B	(Beacon Mall 6:23)	–		6:24	–	–	–	–	6:32	6:36	
11C	–	–	6:21	–	6:33	6:38	6:41	–	–		
11F	– (Mt. Vernon Home 6:25)			–	6:43	6:48	6:51	–	–		
11B	–	6:28	–	6:40	–	–	–	–	6:48		
11D	–	(Backlick & 8land 6:33)		–	–	–	(Hanover & Monticello 6:40)				
11D	6:40	6:54	–	–	–	–	–	7:06	–		
11F	– (Mt. Vernon Home 8:45)			–	7:03	7:08	7:11	–	–		
11B	–	6:48	–	7:01	–	–	–	–	7:11		
11D	–	(Backlick & 6land 6:53)		–	–	–	(Hanover & Monticello				
W 11D	7:00	7:14	–	–	–	–	–	7:26	–		
11F	– (Mt. Vernon Home 7:05)			–	7:23	7:28	7:31	–	–		
11B	–	7:08	–	7:21	–	–	–	–			
11D	7:20	7:34	–	–	–	–	–	7:46			
11F	– (Mt. Vernon Home 7:25)			–	7:43	7:48	7:51	–			
W 11B	–	7:33	–	7:46	–	–	–	–			
11F	– (Mt. Vernon Home 7:45)			–	8:03	8:08	8:11	–			
11D	7:47	8:01	–	–	–	–	–	8			
11B	–	7:53	–	8:06	–	–	–				
11C	–	–	8:13	–	8:26	8:31	8:34				
11B	–	8:20	–	8:33	–	–	–				
11C	–	–	8:33	–	8:46	8:51	8:54				
11D	8:37	8:51	–	–	–	–	–				
W 11B	–	8:50	–	9:03	–	–	–				
W 11C	–	–	9:13	–	9:28	9:31	9:3				
11D	9:32	9:44	–	–	–	–					
11B	–	9:50	–	10:02	–	–					
11C	–	–	10:13	–	10:26	10:31					
W 11D	10:32	10:44	–	–	–	–					
W 11B	–	10:50	–	11:02	–	–					
11C	–	–	11:13	–	11:26	11:31					
11D	11:32	11:44	–	–	–	–					
11B	–	11:50	–	12:02	–	–					
W 11C	–	–	12:13	–	12:26	12					
W 11D	12:32	12:44	–	–	–	–					
11B	–	12:50	–	1:02	–	–					
11C	–	–	1:13	–	1:26	–					
11D	1:32	1:44	–	–	–	–					
W 11B	–	1:50	–	2:02	–	–					
W 11C	–	–	2:13	–	2:2						
11D	2:32	2:44	–	–	–						
11B	–	2:50	–	3:02	–						
11C	–	–	3:13	–	–						
W 11D	3:32	3:46	–	–							
W 11B	–	3:50	–	4:03							
11C	–	–	4:13	–							
11D	4:32	4:48	–	–							
11B	–	4:50	–	5							
11C	–	–	5:10	–							
W 11D	5:32	5:48	–								
11B	–	5:50	–								
11C	–	–	6:10								
11D	6:32	6:45	–								
11B	–	6:50	–								
11C	–	–	7:								
11D	7:30	7:43									
11B	–	7:50									
11C	–	–									
11D/	8:30	8:42									
11B/	–	8:50									
11C	–	–									
11D/	9:32	9:44									

FROM NATIONAL AIRPORT METRO STATION

ROUTE NUMBER	BELLE HAVEN & FT. HUNT ROADS	HOFFMAN BUILDING	U.S. ROUTE 1 & FT. HUNT ROAD	HUNTINGTON AVE. FRINGE PK. LOT	U.S. ROUTE 1 & KINGS HWY.	SOUTHGATE & TOWER DRS.	MT. VERNON HOSPITAL	ROSE HILL	HANOVER AVE. & MONTICELLO BLVD.
11B						6:27		6:38	
11C				6:42	6:48	–	6:57	–	
11B				–	–	–	–	7:03	7:17
11C				–	–	–	–	7:29	7:45
11F						7:35	–	7:48	–
11B				7:45	7:51	–	8:01	–	
11D				–	–	–	–	8:06	8:24
11D						8:33		8:45	–
11F				8:43	8:45	8:51	9:01	–	
11B				–	–	–	–	9:11	9:27
11D						9:35	–	9:48	–
W 11D				9:43	9:45	9:51	10:02	–	
11F				–	–	–	–	10:09	10:24
11B						10:33	–	10:45	–
11D				10:43	10:45	10:51	11:02	–	
11F			:59	–	–	–	–	11:09	11:24
W 11B			–	–	–	11:33	–	11:45	–
11F			–	11:43	11:45	11:51	12:02	–	
11D			11:59	–	–	–	–	12:09	12:24
11B			–	–	–	12:33	–	12:45	–
11C			–	12:43	12:45	12:51	1:02	–	
11B			12:59	–	–	–	–	1:09	1:24
11C		:24	–	–	–	1:33	–	1:45	–
11D		–	–	1:43	1:45	1:51	2:02	–	
W 11B		–	1:56	–	–	–	–	2:09	2:24
W 11C		2:24	–	–	–	2:33	–	2:45	–
11D		–	–	2:43	2:45	2:51	3:02	–	
11B		–	2:59	–	–	–	–	3:09	3:24
11C	.2	3:26	–	–	–	3:35	–	3:47	–
W 11D	–	–	–	3:46	3:48	3:54	4:07	–	
W 11B	–	–	4:02	–	–	–	–	4:14	4:29
11C	4:07	4:11	–	–	–	4:20	–	4:32	–
11D	–	–	–	4:32	4:34	4:40	4:54	–	
11B	4:35	4:39	–	–	–	4:48	–	5:00	–
W 11C	–	–	4:51	–	–	–	–	6:04	5:21
W 11D	4:58	5:01	–	–	–	5:11	–	5:24	–
11B	68	–	–	5:07	5:09	5:15	5:27	–	
11C	:08	–	5:18	–	–	–	–	5:30	5:48
11D	5:09	–	–	5:17	5:19	5:26	– (Mt. Vernon Home 5:42)		
11B	5:10	5:16	5:21	–	–	–	5:31	–	5:44
W 11C	5:20	5:26	–	–	–	–	–	–	–
11D	5:30	5:36	5:41	–	–	–	5:51	–	6:04
11B	5:29	–	–	5:37	5:39	5:45	– (Mt. Vernon Home 6:02)		
11C	32 6:38	–	–	5:50	–	–	–	–	6:02	5:20
W 11D	:40 6:46	5:52	–	–	–	–	–	–	–	–
W 11B	6:47 6:53	6:59	6:04	–	–	–	8:14	–	6:27	–
11C	– 6:51	–	–	–	6:00	8:02	6:08 –	(Mt. Vernon Home 8:25)		
11D	6:02 6:08	–	–	6:20	–	–	–	–	8:32	6:50
11B	– 6:09	–	–	–	6:17	6:18	8:26	– (Mt. Vernon Home 6:42)		
11C	6:12 6:18	6:23	8:28	–	–	–	6:38	–	6:51	–
W 11D	6 6:22 6:28	–	–	–	6:35	6:37	8:43	6:54	–	
11B	.25 6:32 6:38	6:43	6:48	–	–	–	6:58	–	7:11	–
11C	6:35 8:42 6:48	–	–	6:57	–	–	–	–	7:07	7:23
11D	6:50 6:57 7:03	–	–	–	7:10	7:12	7:18	–	7:29	–
11B	7:00 7:07 7:13	7:18	7:23	–	–	–	7:33	–	7:46	–
11C	7:20 7:26 7:31	–	–	–	7:38	7:40	7:46	–	7:56	–
11D	7:40 7:46 7:51	–	–	7:58	–	–	–	–	8:09	8:25
11B	8:05 8:11 8:16	8:20	8:24	–	–	–	8:33	–	8:44	–
11C	8:25 8:31 8:38	–	–	–	8:41	8:43	8:49	–	8:59	–
D 11D	8:45 8:51 6:56	–	–	9:04	–	–	–	–	8:14	6:29
/18/ 11B	9:05 8:11 6:16	9:20	9:24	–	–	–	–	9:33	(Beacon Mall 9:34)	

Light Figures Indicate "A.M.", Dark Figures "P.M."
For Routes 11A, E, G, M, P, T, W, X, Y, Z See Route 11.

W – DESIGNATED TRIPS OPERATED WITH WHEELCHAIR LIFT EQUIPPED BUSES

By the conclusion of the project, 25 demonstrations had taken place. Unfortunately, despite efforts to publicize the demonstrations through local coordinators and through 200 area organizations interested in the handicapped, turnout at several locations was quite small. Approximately 800 persons attended the demonstration, 250 of whom were wheelchair users. Only 9 of the individuals included in the user survey had received training.

WMATA staff now believes an alternative approach might be more cost-effective: setting up a tape or slide show in public locations or forums to raise public awareness without the expense of a bus being present on-site. Of course, the training value of this type of program for individual disabled consumers would likely be reduced, since they would not have the immediate opportunity to try the lift themselves.

3.2.7 Training of Rehabilitation Professionals/Consumers

Human service agencies were encouraged to include the training of handicapped persons by agency staff personnel within their programs of "skills of daily living" rehabilitation training.* As part of the SMD demonstration, George Washington University staff trained accessible bus consumers both directly and via the professionals who routinely interact with disabled people in a rehabilitation context. This effort involved a variety of actions as described below.

3.2.7.1 Training of Rehabilitation Professionals - A survey of a pilot population of rehabilitation professionals was undertaken to examine interest in lift-bus training. It indicated that these practitioners view lift-bus training as a beneficial component of rehabilitation training and one which might prove very fruitful, since almost all thought their clients would use accessible buses, if available. GWURTC consequently prepared a model program to be used by rehabilitation professionals to:

1. identify the various component skills of using an accessible bus,

2. evaluate which clients can benefit from the accessible bus service, and

3. train elderly and disabled in the cognitive, affective and psychomotor skills needed to use the bus.

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*It was hoped that use of transit would be added to the skills normally included in these rehabilitation programs.

The following skills were identified as necessary in order to use the lift-bus unassisted:

1. grasp the handrail on the lift platform while riding the lift (ambulatory);

2. negotiate an incline of 20 to access the ramp (wheelchair);

3. apply brakes or grasp wheels to secure wheelchair while riding the lift (wheelchair);

4. manipulate coins into the fare box (all);

5. negotiate the wheelchair through a turn past the fare box and proceed down the aisle (narrowest point at the turn is 26 3/4 inches) (wheelchair);

6. manipulate the lever, pull it back, pull the restraining arm into a perpendicular position to the control box, and push lever to locked position (wheelchair);

7. reach the safety belt and clasp it (wheelchair);

8. alert the driver of an intended stop by pulling the cord (all);

9. release the seatbelt, push the lever and restraining arms and move to the front of the bus (wheelchair).

The training sessions included a slide presentation and a 15 minute videotape, "The Accessible Bus - Guidelines for the Consumer." GWURTC carried out the training programs for professionals at 12 physical medicine and rehabilitation departments, 4 schools and 12 other locations. A total of 360 allied health professionals were trained.

After evaluating the results of the training of rehabilitation professionals, GWURTC found that significant gains in awareness were detected and sustained after several months. The test questionnaire was designed to address not only the level of learning but "the potential for implementing knowledge acquired into rehabilitation programs."* Unfortunately, however, less than 17% of those participating in a follow-up survey (about four months after training) reported that they

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*Donald C. Linkowski and Terrance J. Martin, Training and Evaluation Programs in the Utilization of Accessible Buses, George Washington University Rehabilitation Research and Training Center No. 9, December 1980.

had informed, referred, directed or trained clients in accessible bus utilization. The respondents were, however, mostly working in acute care settings and may have been unlikely to deal with those individuals ready to be oriented to public transportation. GWURTC concluded that efforts should focus on those professionals who serve disabled individuals beyond this acute stage; this would typically include social workers, recreation workers and rehabilitation counselors. Additional recommendations were that training be called "mobility" rather than "transportation" training to encourage rehabilitation professionals to undertake the task, and that both bus and subway training should be included in the programs.

3.2.7.2 Consumer Training - A selected group of handicapped persons participated directly in the GWU training program. They received:

1. instructions and a demonstration on how to use the lift-bus equipment,

2. familiarization with the lift-equipment, and

3. an opportunity to comment on problems they saw in using the service and to make suggestions to overcome these difficulties.

WMATA identified potential users and provided maps, schedules, and technical assistance to GWURTC pertaining to the lift-bus services. The group was interviewed after the training session to assess the effectiveness of the training programs and to obtain their suggestions of modifications to the program.

3.2.8 Service Start-Up

Twenty-eight lines were originally selected for lift-service. The original implementation schedule called for service to begin on all designated routes in mid-June 1979 following driver run picks. In fact, a two-stage implementation took place.

Lift service for the public began on 12 lines using 32 buses in July 1979 following June's driver run "picks." Service on eighteen additional lines was implemented in September. (A map of the accessible routes is provided as Figure 5-1 in Chapter 5.) As the demonstration progressed, bus service was added on eight more lines (see Table 3-1).

TABLE 3-1. IMPLEMENTATION OF SERVICE

Date	No. of Lines in Service	No. of 1-way Accessible Trips/Weekday
July 1979	12	510
September 1979	30	1214
January 1980	34	1232
April 1980	34	1255
June 1980	36	1250
September 1980	38	1286
January 1981	38	1337
April 1981	38	1297

3.3 OPERATIONS

This section discusses major operational issues including accessibility of bus stops, operating policies, labor and staffing issues, relations with the handicapped community and the role of the media.

3.3.1 Accessibility of Bus Stops

Many handicapped passengers were expected to have difficulty accessing the bus. To minimize the problem, WMATA modified its policy to allow drivers to pick-up and discharge passengers at locations other than designated stops, so that handicapped passengers had ready access to available curb cuts. Even some passengers located within "accessible" distances of lift-equipped routes were expected to require the help of attendants for their trip. (WMATA's reduced fare program for the elderly and handicapped allowed attendants with an appropriate I.D. card to ride at half-fare.) It was hoped that human service agencies would help by providing some feeder service to major transit routes (but this did not occur). Finally, private automobiles used in a kiss-and-ride mode were expected to provide access to stops for many users. In fact, surveys showed that 11% of users accessed the bus stop in this manner.

3.3.2 Operating Policies

Several of WMATA's operating policies had to be changed or modified to accommodate the disabled rider. Primarily these changes affected driver responsibilities; drivers were required: (1) to operate the lifts for handicapped passengers, (2) to provide assistance to those passengers who request it, and (3) to instruct passengers on policy and procedures. Such instructions included: boarding/alighting procedures when the lift is to be utilized; seating priorities when the wheelchair location is needed; and the next scheduled lift-bus if that vehicle cannot accomodate a waiting wheelchair passenger. During the demonstration project period, drivers were also required to record specific information concerning boarding passengers and on any delays resulting from lift use.

Operator guidelines (see Appendix A) were outlined and evaluated in the spring of 1979 and formally implemented in July. They outlined driver responsibilities with regard to inspection and cycling of the lift before beginning the run, passenger eligibility to use the lift, boarding and alighting procedures, assistance to be provided to passengers, and actions to be taken in extenuating circumstances and emergencies. It should be noted that WMATA's policies give drivers considerable freedom to use their judgment in assisting passengers. In addition, drivers of accessible vehicles on non-accessible runs were asked to board waiting wheelchair passengers (see Appendix A). They cannot be compelled to do so.

Of course, mobile street supervisors as well as drivers had responsibilities to help wheelchair passengers complete trips in the event of disrupted service.

3.3.3 Labor and Staffing Issues

The project directly impacted drivers, mechanics, and administrative staff as discussed below.

a. Drivers: Since accessible Metrobus service was offered only on selected routes, only a portion of the bus operators (drivers) were directly impacted by the project. WMATA's drivers pick their runs several times a year and thus many had a choice of either accessible and non-accessible routes. (Of course, drivers with the least seniority may have had little choice in selecting their run assignments.) No extra pay was received for serving as operator on a lift run. However, drivers of accessible runs had to be trained to operate the lift and therefore received 2 paid hours of sensitivity training. WMATA policy required drivers to assist wheelchair

passengers, if requested, and also to collect certain data and distribute survey forms during the evaluation period. No formal agreement with the driver's union was required to implement accessible service. The experimental nature of the project may have contributed to the fact that the lift service and its requirements of drivers never arose as a bargaining issue.

Prior to implementation, it was expected that lift use would not significantly affect route times and, thus, that no additional drivers or driver hours would be required. In fact, the low utilization of the lift minimized any impact on schedules and therefore no changes were ever needed. Layover time remained at about 14% of platform time throughout the project.

b. Mechanics: All WMATA operating and maintenance personnel took on new responsibilities as speciallyequipped buses were maintained and dispatched to provide scheduled service for the special needs public. These responsibilities included cycling and inspecting the lift, performing preventive maintenance on the lift, and insuring that accessible routes were assigned lift-buses. A mechanic specially trained in the maintenance and repair of the lift equipment was stationed at each of the eight garages; the main facility had two such mechanics. These mechanics were selected from among WMATA's existing maintenance staff. These positions represented added expense to the operator. Although they were to be dedicated for the lift program, they did not devote their time solely to lift repairs. In addition to lift mechanics, WMATA employed a Lift Maintenance Supervisor, one of whose duties included supervising major lift repairs, rebuilds and overhauls.

c. User's Trainer: A staff member was hired for a oneyear period to arrange and conduct the training activities, which were offered to potential users at various locations in the Washington area.

d. Coordinator: WMATA employed a full-time Project Coordinator for the Lift-Bus Demonstration Training Program. Principal duties of the Project Coordinator, whose salary was included as a demonstration cost, were to:

1. Contact and advise potential users of the lift-bus service and means of accessing it;

2. Prepare periodic reports on the demonstration training program, as required under terms of the UMTA Grant;

3. Coordinate WMATA and GWURTC joint efforts in the training program;

4. Assist in the development of training, marketing and data collection and reporting procedures guides;

5. Direct the collection of data on the demonstration training program;

6. Revise and finalize WMATA procedure guides for future UMTA training manuals.

3.3.4 Media Coverage

Several articles appeared in local papers over the course of the project which highlighted difficulties lift-users experienced in riding Metrobuses. These articles may have discouraged potential lift-users who had not yet tried the service. About one month after service was fully implemented, an article in The Washington Post described a wheelchair user's 4 hour wait in the rain in Washington's Northwest district (see Figure 3-7). The article specifically documented WMATA's use of non-lift-buses in place of lift-buses and the inability of drivers and supervisors to get the lift, on one of the specially equipped buses, to work. It is quite likely that disabled persons reading this article would be discouraged from trying the service, particularly given the infrequent nature of the scheduled service.

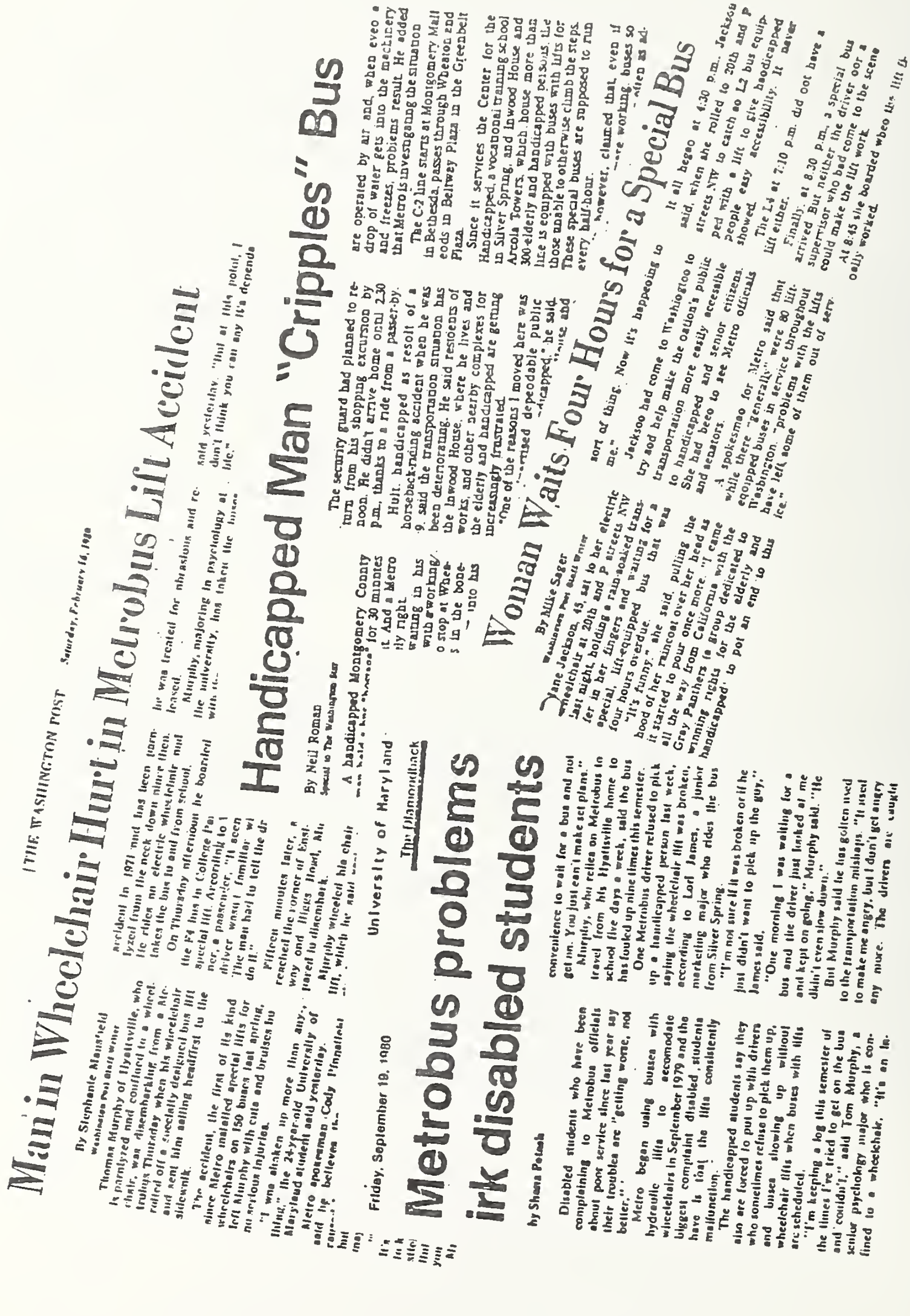
Other articles focused on questionable driver attitudes, mechanical difficulties with the lifts and an incident in which a disgruntled lift-user held up a lift-bus with an inoperable lift for half an hour after a 2½-hour wait in the December cold along a bus line for which half-hour lift service was advertised.

The first lift accident occurred in January 1980 and involved an alighting wheelchair user. Rolling off the lift, the passenger hit the sidewalk but fortunately sustained only minor cuts and bruises. Reports indicated that malfunctioning equipment was responsible. The media's reporting of this accident could have affected ridership potential. Additionally, the accidental death of a blind passenger on Metrorail during July 1980 could have further increased fears among the disabled of traveling on the transit system in general.

Finally, editorials appearing in various newspapers decried the expense of fixed-route transit for disabled people, and implied dissatisfaction on the part of the general public. They may have added to the discouraging effects of reports on the service characteristics.

Figure 3-7

MEDIA COVERAGE



THE WASHINGTON POST Saturday, February 16, 1980

Man in Wheelchair Hurt in Metrobus Lift Accident

By Stephanie Mansfield
Washington Post Staff Writer

Thomas Murphy of Hyattsville, who is paralyzed and confined to a wheelchair, was disembarking from a Metrobus Thursday when his wheelchair rolled off a specially designed bus lift and sent him sailing headfirst to the sidewalk.

The accident, the first of its kind since Metro installed special lifts for wheelchairs on 150 buses last spring, left Murphy with cuts and bruises but no serious injuries.

"I was shaken up more than anything," the 24-year-old University of Maryland student said yesterday.

Metro spokesman Cody Pfanstiehl said he believes the …

… accident in 1971 and has been paralyzed from the neck down since then. He rides an electric wheelchair and takes the bus to and from school.

On Thursday afternoon he boarded the F4 bus in College Pa… special lift. According to … ner, a passenger, "It seem… driver wasn't familiar wi… The man had to tell the dr… do it."

Fifteen minutes later, … reached the corner of East-… way and Riggs Road, Mu… pared to disembark.

Murphy wheeled his chair … lift, which he said …

… he was treated for abrasions and released.

Murphy, majoring in psychology at the university, has taken the buses with … said yesterday, "But at this point, I don't think you can say it's dependable."

Handicapped Man "Cripples" Bus

By Neil Roman
Special to The Washington Star

A handicapped Montgomery County man held a bus "hostage" for 30 minutes … it. And a Metro … ily night … waiting in his … with a working … o stop at Whea… s in the bone… into his …

The security guard had planned to return from his shopping excursion by noon. He didn't arrive home until 2:30 p.m., thanks to a ride from a passer-by.

Hult, handicapped as result of a horseback-riding accident when he was 9, said the transportation situation has been deteriorating. He said residents of the Inwood House, where he lives and works, and other nearby complexes for the elderly and handicapped are getting increasingly frustrated.

"One of the reasons I moved here was … advertised dependable public … handicapped," he said. … House and …

… are operated by air and, when even a drop of water gets into the machinery and freezes, problems result. He added that Metro is investigating the situation.

The C-2 line starts at Montgomery Mall in Bethesda, passes through Wheaton and ends in Beltway Plaza in the Greenbelt Plaza.

Since it services the Center for the Handicapped, a vocational training school in Silver Spring, and Inwood House and Arcola Towers, which house more than 300 elderly and handicapped persons, the line is equipped with buses with lifts for those unable to otherwise climb the steps. These special buses are supposed to run every half-hour.

… however, claimed that, even if … were working, buses so … often as ad…

Woman Waits Four Hours for a Special Bus

By Mike Sager
Washington Post Staff Writer

Jane Jackson, 45, sat in her electric wheelchair at 20th and P streets NW last night, holding a rain-soaked transfer in her fingers and waiting for a special, lift-equipped bus that was four hours overdue.

"It's funny," she said, pulling the hood of her raincoat over her head as it started to pour once more. "I came all the way from California with the Gray Panthers (a group dedicated to winning rights for the elderly and handicapped) to put an end to this sort of thing. Now it's happening to me."

Jackson had come to Washington to try and help make the nation's public transportation more easily accessible to handicapped and senior citizens. She had been to see Metro officials and senators.

A spokesman for Metro said that while there "generally" were 80 lift-equipped buses in service throughout Washington, "problems with the lifts have left some of them out of service."

It all began at 4:30 p.m., Jackson said, when she rolled to 20th and P streets NW to catch an L2 bus equipped with a lift to give handicapped people easy accessibility. It never showed.

The L4 at 7:10 p.m. did not have a lift either.

Finally, at 8:30 p.m., a special bus arrived. But neither the driver nor a supervisor who had come to the scene could make the lift work.

At 8:45 she boarded when the lift finally worked.

Friday, September 19, 1980 University of Maryland The Diamondback

Metrobus problems irk disabled students

by Shana Potash

Disabled students who have been complaining to Metrobus officials about poor service since last year say their troubles are "getting worse, not better."

Metro began using busses with hydraulic lifts to accomodate wheelchairs in September 1979 and the biggest complaint disabled students have is that the lifts consistently malfunction.

The handicapped students say they also are forced to put up with drivers who sometimes refuse to pick them up, and buses showing up without wheelchair lifts when buses with lifts are scheduled.

"I'm keeping a log this semester of the times I've tried to get on the bus and couldn't," said Tom Murphy, a senior psychology major who is confined to a wheelchair. "It's an inconvenience to wait for a bus and not get on. You just can't make set plans."

Murphy, who relies on Metrobus to travel from his Hyattsville home to school five days a week, said the bus has fouled up nine times this semester.

One Metrobus driver refused to pick up a handicapped person last week, saying the wheelchair lift was broken, according to Lori James, a junior marketing major who rides the bus from Silver Spring.

"I'm not sure if it was broken or if he just didn't want to pick up the guy," James said.

"One morning I was waiting for a bus and the driver just looked at me and kept on going," Murphy said. "He didn't even slow down."

But Murphy said he has gotten used to the transportation mishaps. "It used to make me angry, but I don't get angry any more. The drivers are caught …

In the spring of 1981, a relatively favorable article appeared which indicated improvements in the lift-equipped Metrobus service. However, it is questionable whether reports of improved service overcame the poor reputation the service already had received. The importance of ensuring good quality service at its introduction should be emphasized. While early WMATA testing phases were designed to avoid start-up difficulties, they failed to do so, creating a situation in which early service failures helped to create a poor image of the service.

3.3.5 Relations with the Handicapped Community

WMATA's 22-person permanent Elderly and Handicapped Transportation Advisory Committee includes representatives of advocacy and rehabilitation/service organizations for disabled and elderly people as well as individuals with various disabilities. It was formed in October 1979 to provide input to the authority on the refinement of all services to meet the needs of elderly and disabled persons and to specifically help WMATA meet the requirements of Section 504. The committee's guidance was requested in WMATA's transition planning since, with only 151 lift-equipped buses, WMATA was unable to meet its 50% accessible bus fleet requirement (of about 800 buses) by the target date of July 1982.

The transition plan included an interim service which involved the use of accessible buses on fixed-routes in a demand-responsive manner. Specifically, the plan called for accessible buses to be dispatched to routes to meet requests for lift service on a daily or recurring basis.

Over the course of the demonstration, the committee addressed a variety of issues, including priority seating, lift-bus service and routes, marketing programs and policy and procedure guidelines. The committee was briefed at bi-weekly meetings by the Office of Bus Services on the lift-bus operation and by other departments of WMATA on other issues. Particular concerns related to reliability of the lift equipment, the schedule of lift acquisition and accidents involving lift-users. With respect to one such accident, it is noteworthy that some committee members expressed the opinion that "such incidents, although serious and worthy of detailed investigation, should not be put out of perspective . . . and . . . may be in the nature of the risk disabled people must assume by their increasing exposure to the 'outside' world."

Some of the specific comments made by the committee early in the project related to:

1. insufficient aisle width of advanced design buses;

2. need for color contrast in the bus interiors;

3. lack of driver skill in lift operation due to infrequent usage;

4. need for routine operation of the kneeling feature;

5. lack of adequate shelters and benches;

6. criteria for bus stop location;

7. allocation of lift-bus routes; and

8. lack of curb cuts.

As service progressed, the committee indicated further their concern over the lack of driver skills and cooperation. The committee provided input into new operator policies and procedures. The committee frequently offered suggestions to solve various problems they had identified, for example, creation of a "special needs" office, employment of youth attendants, kneeling all non-curbed buses, and WMATA's testing of the DeLorean bus.*

The advisory committee was a genuine attempt at serious dialogue with the disabled community; however, it is noteworthy that most of the meetings were devoted to Metrorail issues. Although as many as 38% of the committee members were wheelchair users, only one of them was a regular user of Metrobus. In contrast, all are Metrorail users. Thus it may not have been a representative group, it did not sufficiently focused on key issues involving Metrobus service.

3.4 POST-DEMONSTRATION ACTIVITIES

Upon the release of the new DOT interim regulations of July 1981 rescinding the May 1979 Section 504 rules, the advisory committee expressed its position, in a resolution, that the new interim rules were "wholly inadequate" and that at a minimum, the rule should be interpreted by WMATA to provide "a level of service equivalent to the Interim Services Plan."

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*This German-built bus has a 22 inch floor height and is equipped with a ramp or lift. It had been proposed as a possible Transbus.

WMATA's course is still somewhat unclear. WMATA's board requested a reevaluation of the accessible service and the advisory board has been reviewing proposals and is considering a proposal to provide all services on an "on-call" basis (similar to the Interim Service Plan except excluding the current scheduled routes). It appears that in this proposal, coverage, reliability, and accountability would be expanded in exchange for reduced travel time flexibility. In the meantime, accessible service is continuing and funds for retrofitting the remaining 130 Flxible vehicles remain intact. However, new orders for advanced design and articulated buses have been revised to exclude lifts and plans are underway to rehabilitate a large number of older buses without installation of lifts.

4. EQUIPMENT CHARACTERISTICS

Operators of lift-equipped bus service for the handicapped have generally found that hydraulic lift equipment is subject to frequent breakdowns. Such malfunctions have serious implications for the operator's ability to serve the handicapped population and for the likelihood of disrupting service for non-handicapped patrons. They can also greatly increase the cost of making transit service accessible.

In this evaluation, repair and maintenance data, driver and mechanic evaluations, and user attitudes and suggestions regarding the equipment were used to assess the suitability, maintainability and reliability of the lift device and other bus modifications required to improve accessibility for the handicapped on the fixed-route bus system.

4.1 DESCRIPTION OF LIFT BUS FEATURES

To implement the demonstration service, WMATA purchased 261 40-foot "New Look" Flxible buses; 131 of which were specially-equipped with lifts and wheelchair securement devices, the remainder designed for possible retrofitting at a later date. In addition, 20 31-foot Flxible lift-equipped buses were purchased for use in the downtown circulator service.

The lift-buses, like the rest of the Metrobus fleet, are only 96 inches wide in order to meet Virginia's legal restrictions on bus width. This limits maneuverability for wheelchair passengers. The lift-buses do, however, have wider doors (36 inches rather than 32 inches) to help accomodate wheelchairs.

The two major modifications included on the buses are: (1) lift devices for boarding and alighting, and (2) special flip-up seats and securement arrangements, described below.

4.1.1 Lifts

The lift installed on WMATA's Metrobuses is the Travelift, produced by the Vapor Corporation of Chicago, Illinois (see Figure 4-1). A positive stow lock has been added to earlier models of the lift to prevent the lift from drifting down and away from the bus, a problem experienced in other locations. The lifts were factory installed by the bus manufacturer, Flxible Corporation. Some modifications were made by Flxible to correct problems uncovered during initial testing and during operation in Milwaukee. These included repairs to leaks in the hydraulic system, correction of improper wiring, and the installation of sensitive edges instead of a pressure switch to ensure that the lift platform stops in the correct position when lowered.

In its stowed position the lift acts as the normal step entrance to the transit vehicle. Hinges connect the upper and lower steps with two risers; when the lift is lowered these four parts form a single flat platform of 54 inches in length with an angled ramp at the end (see Figure 4-2). To use the lift, the handicapped passenger maneuvers the wheelchair onto the lowered platform. The driver then activates the angled ramp, which folds up to become a safety flap, preventing the wheelchair from slipping off the level platform. The platform can then be raised safely to the vehicle floor level, and the passenger may maneuver the wheelchair into the vehicle (Figure 4-3 illustrates lift operation for a passenger). After the passenger leaves the platform, it may be folded back into the step configuration. A complete lift cycle takes a minimum of 45 seconds, although the speed can be adjusted to increase the cycle time; of course, much of the time involved in boarding a passenger is required to maneuver the wheelchair into position and to secure the chair in the tiedown location. Passenger boarding times recorded by drivers averaged 3 to 3 1/2 minutes.

The lift is electrically controlled with a panel of buttons on a control console located by the driver seat. Each button controls a different portion of the lift operation. To operate the lift, the driver must press the buttons in sequence, and must keep each button depressed until that operation is complete. The buttons light up to indicate the correct operating sequence. To prevent dangerous operator errors, the sequence has been designed so that two buttons must be depressed at the same time in order to fold the steps into the stowed position. The bus door cannot be closed until the lift is in the stowed position, and safety interlocks prevent movement of the vehicle during the loading or unloading procedure. In the case of electrical failure, the lift can be operated manually. As a result of damage to the lifts, which occurred when drivers

Figure 4-1

THE VAPOR TRAVELIFT

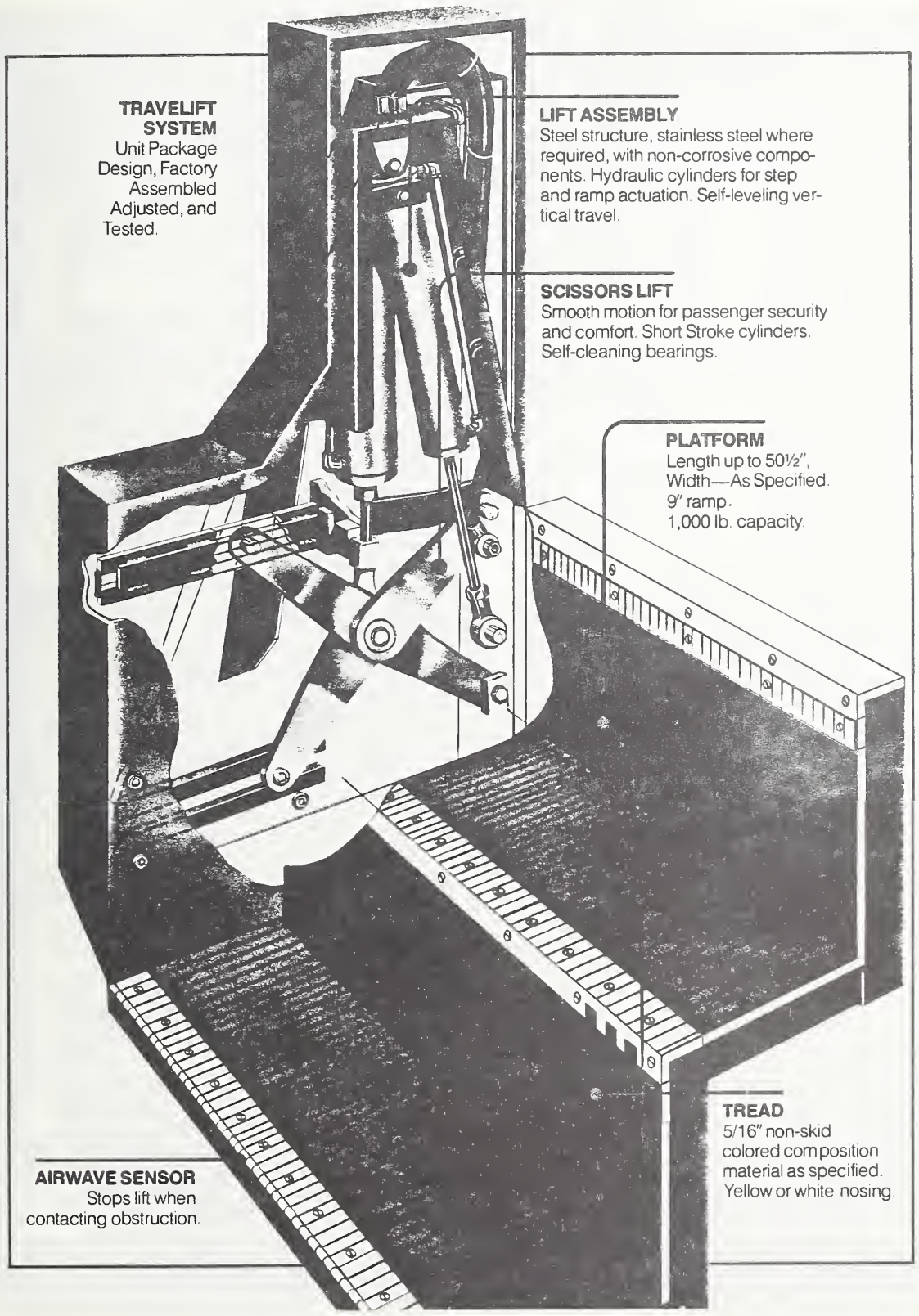


Figure 4-2

TRAVELIFT OPERATING SEQUENCE

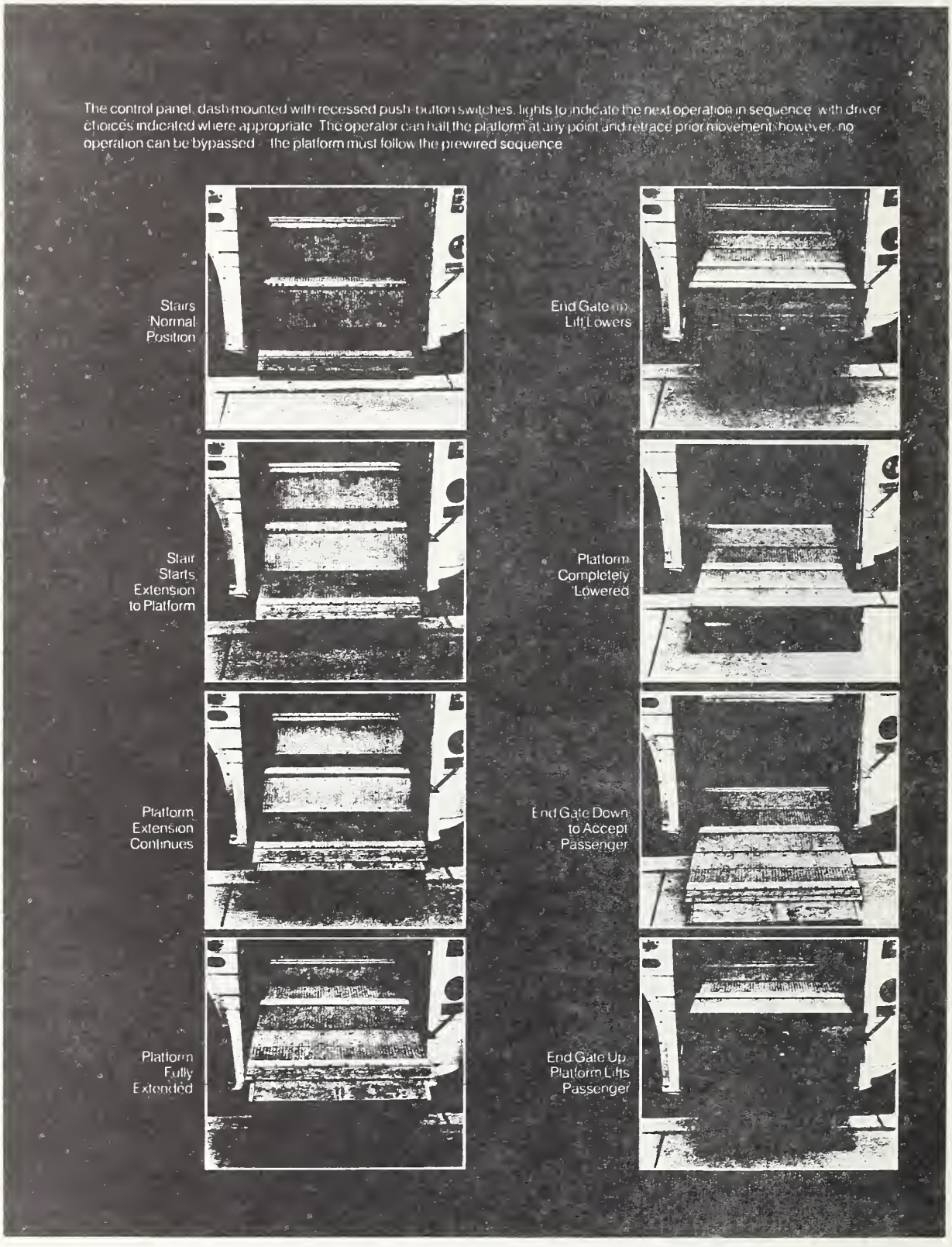
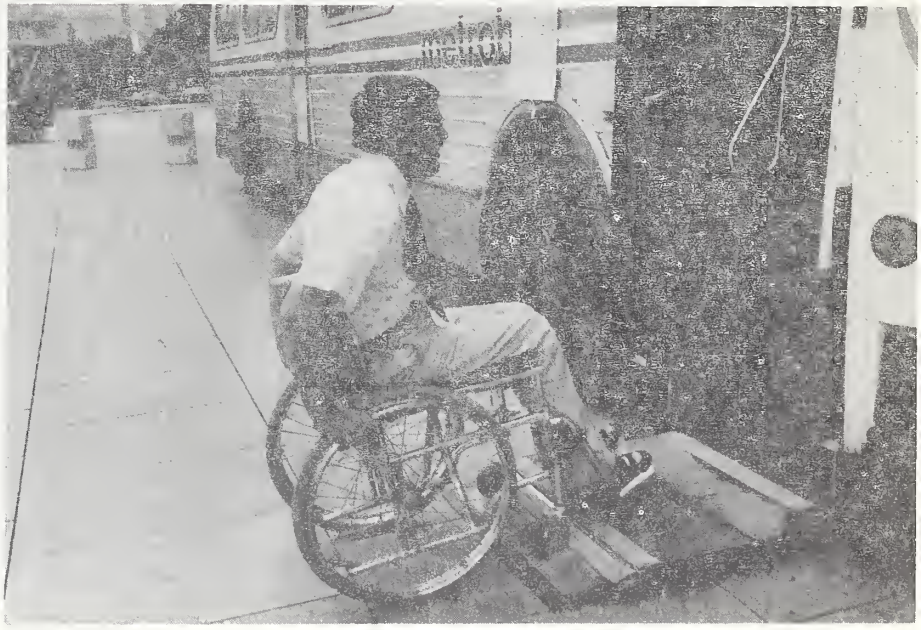


Figure 4-3 PASSENGERS USING THE LIFT



Photographs Courtesy of George Washington University (RT-

attempted to operate them manually, WMATA permits such manual operation by qualified mechanics only, and has removed from the buses the T-handles used to crank the lift.

4.1.2 Tiedown Arrangements and Other Modifications

In addition to the lifts, Flxible installed flip-up seats and "modesty" panels to secure wheelchairs on the bus. Each bus has two three-passenger "jump" seats located in the forward portion of the bus which, when flipped up, have a padded arm which can be extended to secure the wheelchair (see Figure 4-4). These devices are manufactured by Otaco, a Canadian company. Safety belts attached to a panel behind each set of seats provide additional security. Due to the difficulties in reaching the safety belts, their use was made optional. Since there are two wheelchair locations per bus, the total seating capacity for other passengers is reduced from 48 to 42 when both wheelchair locations are occupied.

As a result of the lift and the wheelchair tiedown positions, the interior layout of the bus had to be changed. This reduced the amount of legroom allowed for other seats, and resulted in the elimination of two stanchions within the bus and the repositioning of the grab rail at the entry door. Able-bodied and elderly passengers have complained about these changes.

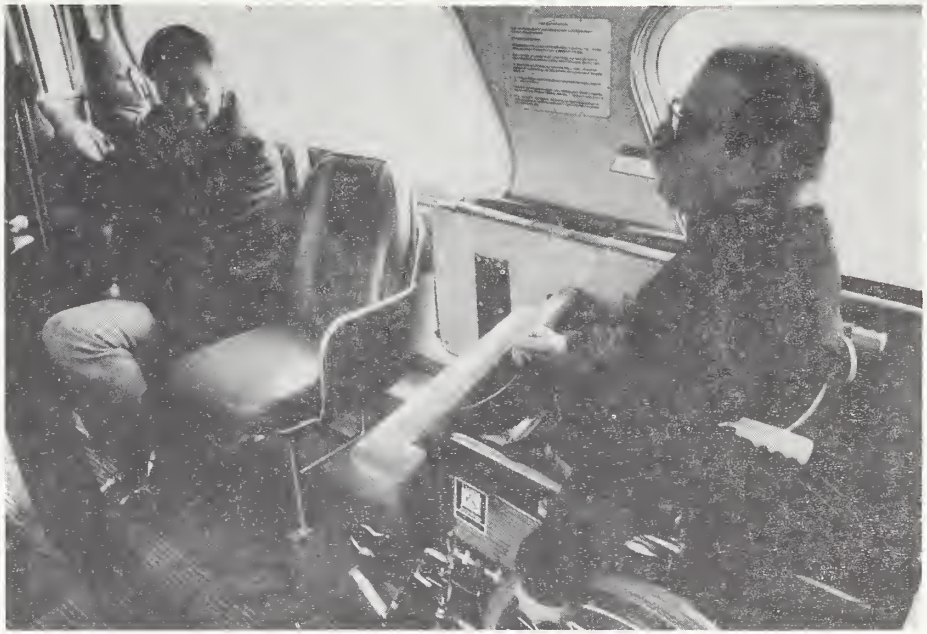
One should also note that the initial step height has been affected by the lift. The bus suspension (and consequently the height of the first step) had to be raised 1" after WMATA had some problems with damage to the lift. (Of course, the lift-buses kneel for those who have difficulty with the first step.) In addition, the rise of the third step is higher than normal; instead of 9¼" and 10" risers, the lift-bus has 8¼" and 12" risers.

4.1.3 Acceptance Testing

Acceptance testing of the lifts was conducted in late 1978. The lifts were cycled repeatedly times and checked for hydraulic leaks. Although many leaks were detected, WMATA was able to correct them; serious problems were very rarely found. Vapor immediately sent necessary parts to remedy defects.

To obtain the passenger perspective, lifts were also tested at bus stops by wheelchair users and GWU staff, as part of GWU's engineering evaluation (described in Section 3.2). Among the lift components tested were endgates and sensitive edges;

Figure 4-4 OPERATION OF THE WHEELCHAIR TIEDOWN DEVICE



Photographs Courtesy of George Washington University (RT-9)

the need for a "serpentine-shape" sensitive edge to cover the area under the platform was determined right away. This improvement was made by Vapor mechanics at no cost to WMATA in the fall of 1979, after service had already been initiated.

4.2 EQUIPMENT PROBLEMS

4.2.1 Maintenance Perspective

During the demonstration, WMATA experienced problems with both the lift and the bus itself. For example, severe transmission problems were encountered with both lift and non-lift Flxible buses. As a result, they experienced considerable downtime from the beginning of the demonstration, exacerbating problems involving lift service availability.

WMATA's Lift Bus Program Shop Supervisor believes that, after considerable modification, the Vapor lift is now performing reliably. There were, however, noteworthy design flaws which needed correction. Vapor Corporation assisted WMATA in making these modifications, which are discussed below:

1. Lift Control Consoles - The control panel was found to be rather confusing to drivers, who had difficulty relating the sequence of lift functions to the positioning of the control buttons. WMATA redesigned the panel to incorporate a logical numbered sequence for drivers to follow (see Figure 4-5). A special slide was added to prevent drivers from accidentally pressing both the reset and lower buttons, which would override the sensitive edge after it had struck the ground. Dust covers have also been added to the consoles to reduce dirt accumulation which caused problems with the control buttons. It takes 4 hours to rewire the console and 20 minutes to change the panel. By the end of the demonstration period, more than three-quarters of the consoles had been modified and the remainder were scheduled for completion. WMATA performed and bore the full cost of this improvement.

2. Sensitive edges - The original design of air-pressure sensitive edges on the lift was found to be inadequate. Vapor Corporation added a new serpentine-shape sensitive edge to cover the bottom of the lift platform and

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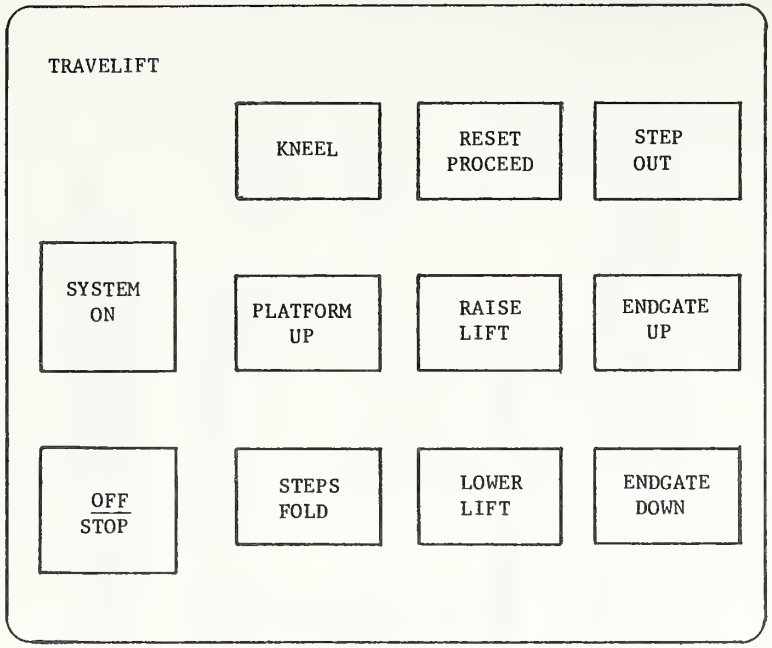
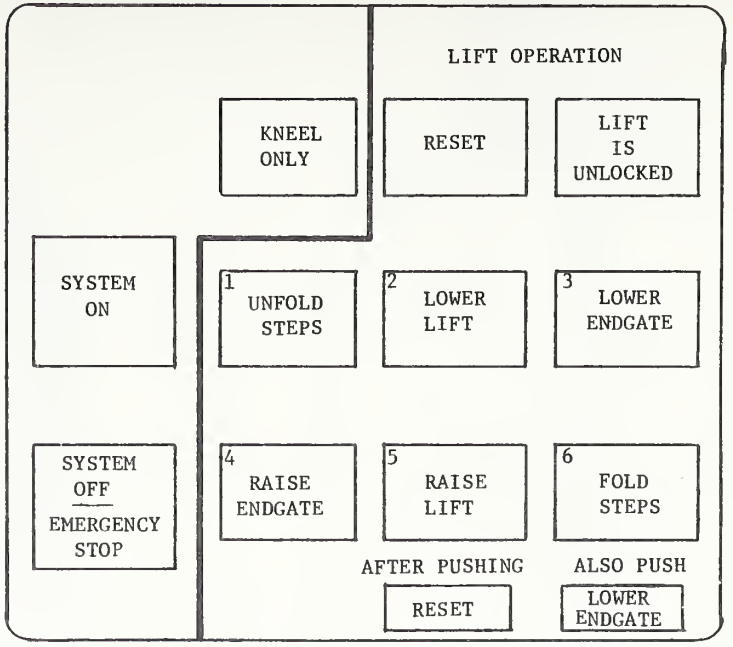
*Based on discussions with WMATA's Lift Bus Program Shop Supervisor M. Kurtz.

Figure 4-5

VAPOR LIFT CONTROL CONSOLE



ORIGINAL VAPOR LIFT CONSOLE ON FLEXIBLE METROBUSES



RELABELING OF VAPOR LIFT CONTROL CONSOLE

Source: Kilisankar Mallik, WMATA Lift Equipped Kneeling Bus for Accessibility and Safety of Persons with Transportation Handicaps (Final Report), The Rehabilitation Research and Training Institute, The George Washington University, June 1981.

a straight sensitive edge to the inboard side of the lift (in addition to four other sensitive edges) (see Figure 4-6).

3. Sensitivity of switches - Sensitive edge switches were adjusted to make them more responsive.

4. Protective switches - A new switch was developed with a protective rubber boot to improve weatherproofing and prevent contamination.

5. Oil pressure switch - This switch (which operates as a back-up to the sensitive edge device) was disconnected due to problems in winter when increased viscosity of the oil would set off the switch. The improved sensitive edge device compensates for its elimination.

6. Endgate linkage - WMATA replaced the endgate linkage arms with a thicker bar to reduce bending.

7. Platform - The center portion of the lift has occasionally required repair or replacement due to damage caused by accidentally jacking up the bus. The jacking force caused cracks in the platform at the weakest point, requiring welding or installing a new center portion (steps/platform). The weld reinforcement kit costs $70 per bus. A new center portion which can be obtained separately costs $2700. WMATA has borne all parts and labor costs associated with this repair.

8. Sliders - New brass sliders (with greater leeway) have been installed to replace nylon sliders so that the endgate can bend back.

9. Latches - Brass latches have been replaced with steel latches which retain smoother edges.

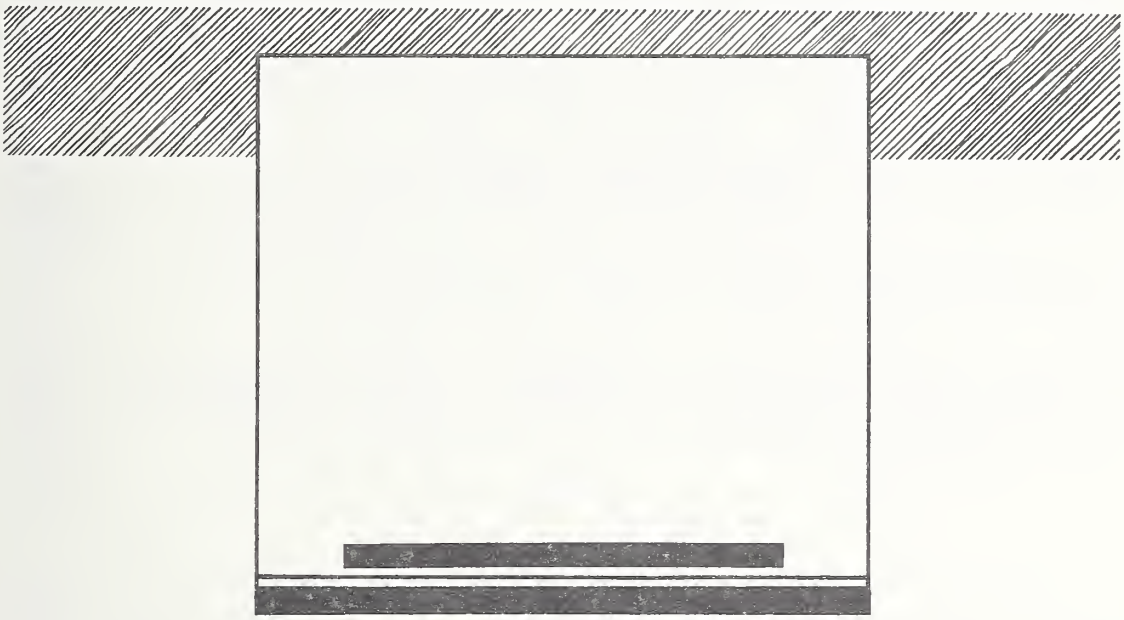
10. Pivot pins - New pivot pins have been used which can be changed without drilling through welds.

11. Positive Stow Lock - Vapor improved the positive locking device by adding a hydraulic component to the spring-based mechanism.

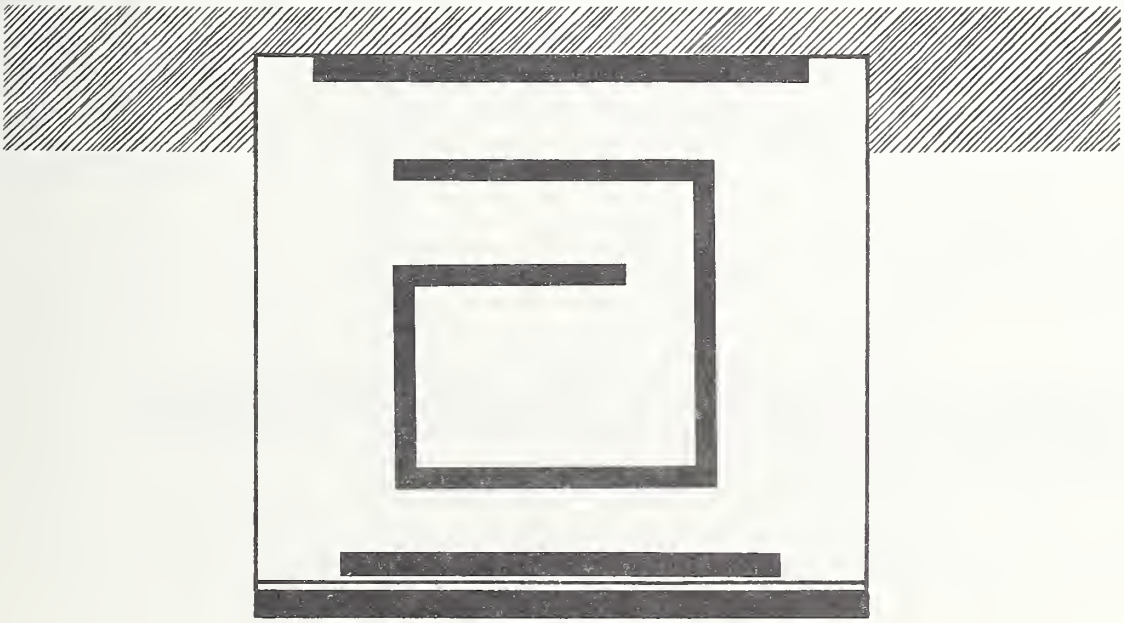
With the modifications made by WMATA (assisted by Vapor Corporation), reliability has "greatly improved." WMATA has not experienced major problems with lift hydraulics nor with repairs of the lift mechanism itself.

Figure 4-6

SENSITIVE EDGE DESIGN



Original Design
(Underside view)



Revised Design

Many of the problems with the Vapor lift design noted by Seattle Metro in their comparative evaluation of lifts have not occurred,* presumably because redesign of the Vapor lift has eliminated many of these problems. For example, proportionators designed to even out the pressure in the two cylinders have eliminated the problem of improper stowing. Counterbalance valves in the cylinders to prevent the lift platform from drifting downward also seem to be working effectively. Shuddering has not been a problem; if it does occur, lubrication of the tracks is all that is needed to restore smooth operation. The platform self-corrects for sagging of up to one half inch -- the self-correcting device is standard equipment.

When problems arose, replacement parts availability was a major problem. Many of the parts needed for the lift are produced for Vapor by subcontractors. As a result of the slow return of rebuilt parts and the lack of a supply of new components, WMATA had to undertake in-house fabrication of some parts, resulting in both extra work and delays.

Table 4-1 shows the distribution of repairs by type. Despite some modifications to switches, they constituted the single most frequent repair.

TABLE 4-1. REPAIRS BY TYPE

Electrical (switches, wiring, etc.)	90	27%
Mechanical Linkages	58	18%
Hydraulic	8	2%
Cylinders	26	8%
Sensitive Edge	26	8%
Endgates	18	5%
Adjustments	20	6%
Protective Shielding	16	5%
Lift Framework	26	8%
Bus Framework	4	1%
Lift Jammed	10	3%
Miscellaneous	28	8%

*Municipality of Metropolitan Seattle, Evaluation Report on Five Wheelchair Lift Options for Installation in Transit Coaches, January 1979.

The greatest single problem has been damage to the lift when in its stowed position. The lift's location at the right front section of the bus is a factor, since this part of the bus is the curb side and is most vulnerable. Combined with the fact that the lift has only eleven inches of clearance from the ground, it is easy to see why pot-holes, curbs and other objects in the roadway have been able to cause a continuous stream of damage to the lifts. In addition to the less than perfect roadway conditions on public roads, the authority's own property has been pinpointed as a key factor; pavements are in poor condition at several garages and have not been repaired. Compounding the problem of the lift's vulnerability is the fact that the structural integrity of the bus was also affected by the installation of front door lifts. Considerable expense has been incurred to repair front end damages. As much as $3500 in parts and labor has been required for some major accidents; this is over half of the original lift cost.

It should be noted that much of the damage occurred without the filing of an accompanying accident report. Apparently, drivers are not always aware of the damage or fail to report it. Maintenance records clearly indicate the problem; in fact, these records were transmitted to the safety department and the topic was raised with the Advisory Board in an effort to reduce these costly accidents. However, These measures were not very effective.

WMATA is also still experiencing damage from drivers jacking up the bus. This occurs when a driver continues to lower the lift after it has reached the ground. Jacking results in the need to replace torsion bars and cylinder shafts. About 80% of major repair work (all of which is performed at the Bladensburg shop) is due to accidental damage or driver error; the jacking problem is a good part of this expense. As many as 48 cylinder lifts were replaced in one 2-month period in the winter of 1981. The lack of sufficient replacement shafts contributed to availability problems until February 1981 when a new shipment was received.

To prevent jacking, WMATA's lift maintenance supervisor requested the purchase of lift pressure relief devices at a cost of $240 per bus, but at first this expenditure was not approved. (Despite the high cost of this modification, it has been estimated that the repair costs to buses damaged in this way had been higher than $240.) Instead, a less costly modification was to be made which would have been less effective than the pressure relief kit where curbs were high, but should have eliminated most occurrences. Recent indications are that WMATA has reconsidered its decision and will purchase the pressure relief kit. The kit will effectively replace the sensitive edge device.

It is important to note that while jacking of buses may have constituted as much as one-quarter of repair labor costs, the problem was relatively ignored. Since driver error is often a contributing factor (i.e., a driver should be aware of when the lift touches the ground even if the sensitive edge), it is likely that retraining (as noted early in the project) and discipline could have had an impact on repair costs. However, WMATA felt that the equipment is still experimental in nature and was apparently too sensitive for normal driver operations.

4.2.2 Driver Perspective

A survey of WMATA's lift and non-lift-bus drivers provided their perspective on issues of equipment design. The majority of drivers who had operated the lift had experienced problems several times, primarily involving failure of the lift to lower or rise and malfunctions of the safety interlock mechanism. Their assessment of the overall reliability of the lift equipment was mixed, with an equal number of drivers saying it was and was not reliable (and the remainder not sure).

Drivers of non-accessible runs were occasionally assigned lift-buses. They were as likely as assigned lift drivers to experience problems when operating the lift equipment and those that did experienced much the same difficulties. Non-lift drivers were somewhat more likely, however, to perceive the lift as unreliable. Since non-lift drivers have had less experience with the lifts, it is possible that word-of-mouth among drivers or attitudes about the service concept have exaggerated the perception of the problems.

4.3 EQUIPMENT MAINTENANCE AND REPAIR

WMATA expected the introduction of the lift equipment to add considerably to bus maintenance requirements and therefore allocated nine additional, specially trained mechanics to this task as well as one lift maintenance supervisor. The number of mechanics was later increased by one, resulting in one lift mechanic for every 15 lift-buses. (In comparison, the Milwaukee County Transit System, whose fleet includes some GM RTS-II's as well as Flxible/Vapor buses, has one full-time lift mechanic for each 37 buses.) One lift mechanic is available at each division, in addition to two mechanics at the Bladensburg shop where major repairs on lifts (such as platform and lift changes and rebuilding of hydraulic units) are carried out.

All lift mechanics were trained at WMATA. Before the lift-buses were delivered, Vapor Corporation held a 1-day class for the supervisor and all mechanics expected to be working on the lifts; however, the class was not very useful because lifts were not available on the property. Later in the demonstration, lift mechanics from each division spent one week at the Bladensburg repair shop working with its highly skilled mechanics and the Lift Maintenance Shop Supervisor, in order to continue developing their skill and experience.

4.3.1 Preventive Maintenance Procedures

Most of WMATA's eight divisions nominally adopted the inspection procedures outlined in Vapor Corporation's lift maintenance manual. However, they did not adhere to these preventive maintenance procedures. Because WMATA was typically short of mechanics, lift mechanics were often assigned to non-lift repairs instead of necessary lift preventive maintenance. As a result, preventive maintenance of the lifts suffered.

WMATA developed its own simplified and less repetitious inspection sheet in January 1981 in an attempt to improve adherence to a more realistic preventive maintenance schedule. WMATA now requires mechanics to perform daily visual inspections and cycling of the lift and a 3000-mile inspection, in which a filter change is no longer mandatory. Lubrication is performed along with general inspection at 9,000 and 45,000 miles. Neither lubrication nor inspection are time-consuming tasks, since visual inspection of lines and switches is usually all that is needed and lubrication is a few-minute process using a silicone spray. Also, inspection activities are often done when other repairs are required. In some divisions, the regular bus inspection crew also services the lift. Typically, the night shift does an operations check of the lift and will either repair a defective lift or assign it to a non-lift run for the next day. Top priority is given to repairing lift-related problems which incapacitate the entire bus. There has reportedly been no big backlog of lift repairs.

4.3.2 Repair Hours

If all nine or ten lift mechanics worked full-time on the lifts, a total of 1600 to 1760 lift-repair (and maintenance) hours per month could be expected. However, despite the fact that lift availability was inadequate at several divisions and that accessible service levels were considerably deficient, this amount of time was hardly ever expended on the lifts. Lift mechanics were diverted to other maintenance tasks, which apparently were considered to be more important.

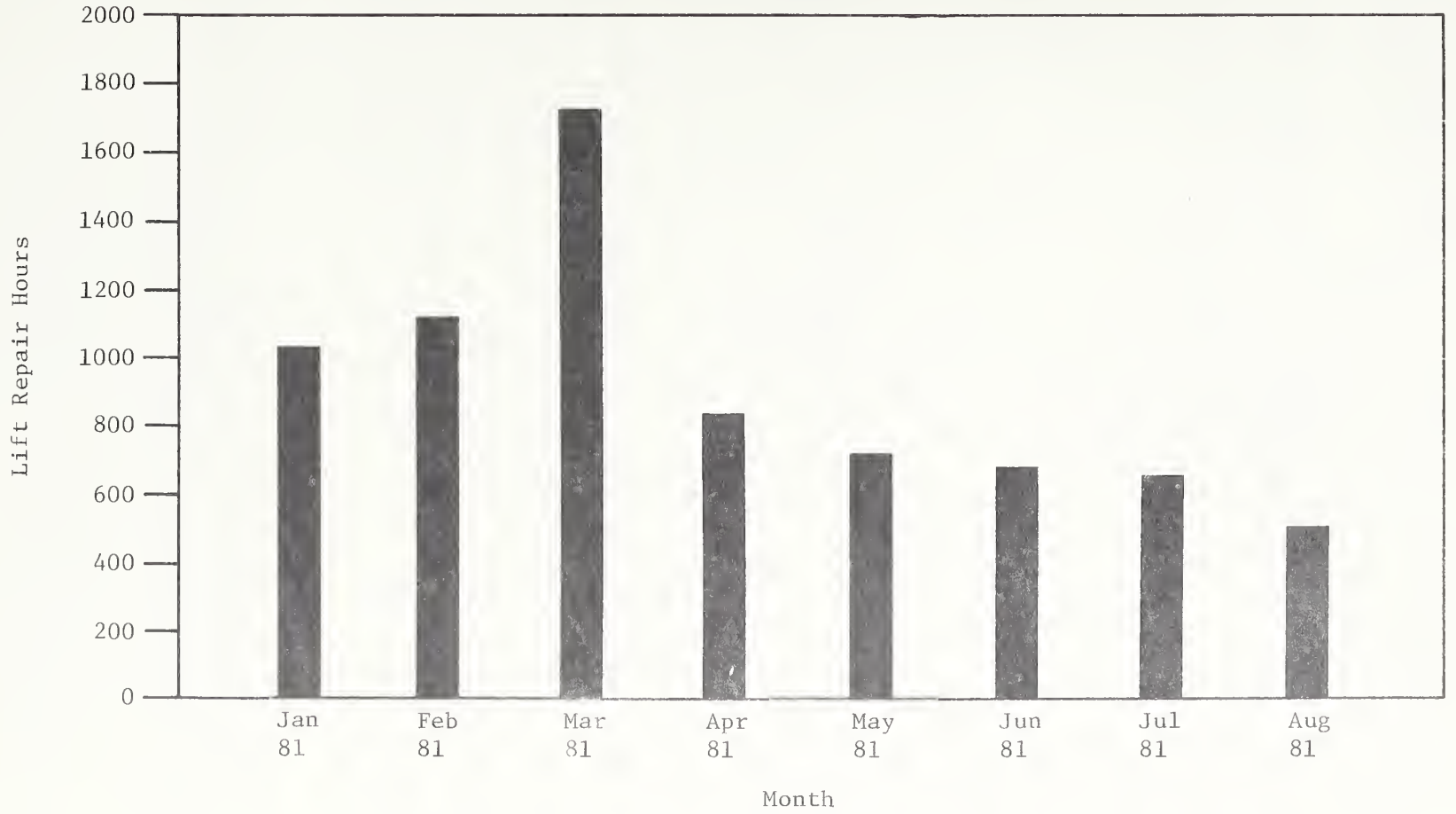
Data from eight months of 1981 show average expenditures of just over 910 hours per month or about 5 mechanic-months per month (see Figure 4-7). Although the last 5 months show a reduced number of hours (i.e., average of 684 hours), it is difficult to evaluate the downward trend due to differences in data collection methods over the evaluation period. For example, it was only in the last 5 months that division maintenance clerks tabulated repair hours on specially-designed lift maintenance summary forms; even then, it appeared that all divisions were not recording information in an identical manner. Prior to the use of the special forms, data for the evaluation was derived from vehicle repair orders in which proper classification of lift repairs and maintenance was apparently dubious. It also should be noted that the level of maintenance of the lifts varied considerably from month to month due to a variety of factors, including a thorough fleet-wide inspection of the lifts in January 1981 and the need to assign priority to air conditioner repairs in the late spring. Thus, some caution must be exercised in analyzing the average repair hour figure.

The average number of repair hours expended represents about 6 hours per bus per month. If the brief daily inspection conducted requires about 5 minutes per bus per day per mile, one would use 2½ hours per bus per month to accomplish this task alone, which implies that about 3½ hours of actual lift repairs were required per bus per month. Note that the Milwaukee County Transit System averages about 4 hours of repair and maintenance per bus per month.

The repair hours spent at each division varied considerably. If we compare divisional percentage of systemwide lift repair hours to the expected percentage based solely on the allocation of lifts (average of total and scheduled fleet), we see that one division expended two and one half times the expected percentages while several spent only half. It is interesting to note that the garages with the fewest repair hours tended to have the least availability. This suggests the causal relationship of "fewer maintenance/repair hours spent result in lower availability" rather than "lower availability results in more maintenance/repair hours." In addition, it may indicate that at certain divisions maintenance of the lifts received a lower priority.

Figure 4-7

LIFT REPAIR HOURS



4.4 ROAD BREAKDOWNS AND LIFT AVAILABILITY

Expecting lift availability to be a potential problem, WMATA reserved 37% of its lift-bus fleet for use as spare lift vehicles (i.e., they were not assigned to lift service but were operated on non-accessible routes). It was hoped that this large spare ratio would compensate for possible equipment problems and would insure that scheduled service would be provided reliably. This, however, was not the case.

During the demonstration, WMATA's control center maintained data on the number of road breakdowns and change-offs* of lift vehicles and whether these problems were due to failures of the lift mechanism. In the six-month period beginning January 1981, for which the most reliable information is available, it appears that the lift has been the source of over 40 road breakdowns and just under 30 change-offs per month, or at least 1 road breakdown and 1 change-off per day systemwide (see Figure 4-8). This means that about 2 of every 1000 one-way lift-bus trips involved either a road breakdown or change-off. On the average, the lift was the cause of 15% of all lift-bus road breakdowns and 10% of all lift-bus change-offs. Note that there is considerable monthly variation in these figures. During 1981, there was a steady increase in incidents until June when a reduction occurred. Earlier reports for the first half of 1980 showed an incidence of road breakdowns and change-offs considerably less than that in the first half of 1981; however, there is less confidence in the earlier figures. If accurate, they would indicate that lift reliability first improved and then dramatically worsened over one and one-half year's time.

Availability of lift-buses suffered from the unreliability of the lift equipment and of other vehicle systems. Lift status reports prepared several mornings each week by the division maintenance supervisors provided a good source of information on lift-bus availability. These reports indicate that for the first nine months of 1981 lift-bus availability fluctuated between 70% and 90% of the lift-bus fleet (see Figure 4-9). At no time during this six month period did the systemwide availability fall below 62.9%, the minimum required to meet the schedule. Although WMATA's spare ratio of 37% may appear to be high, the Milwaukee transit system has reported similar maintenance and repair problems and currently maintains a 40% spare ratio.

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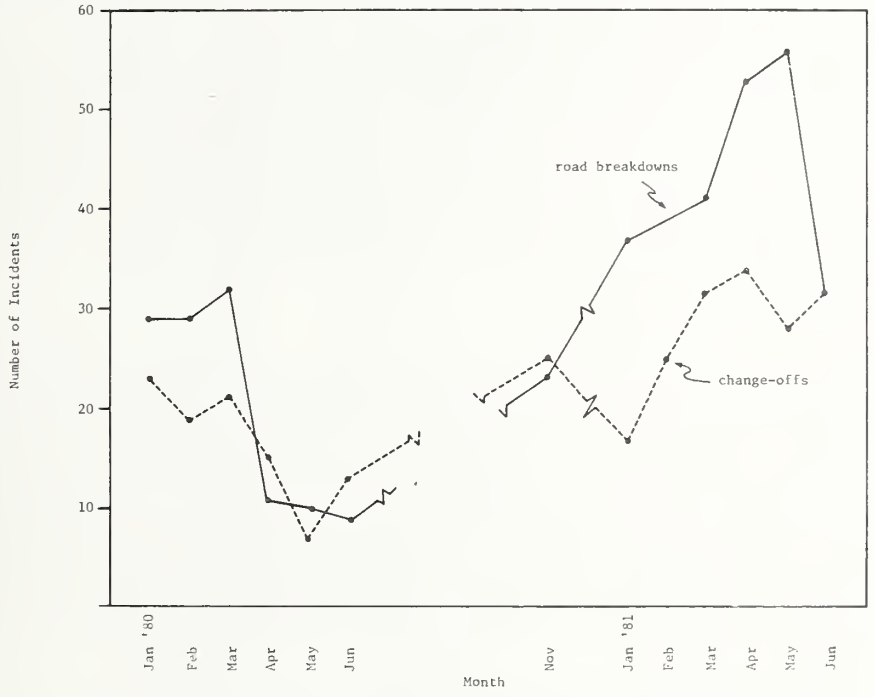
*A road breakdown is defined as a road call in which a mechanic is sent to an inoperable bus and a repair is made, either on the road or after the bus is brought to the garage; a change-off is when a substitution is made on the road.

Figure 4-8

ROAD BREAKDOWNS AND CHANGE-OFFS DUE TO LIFT PROBLEMS



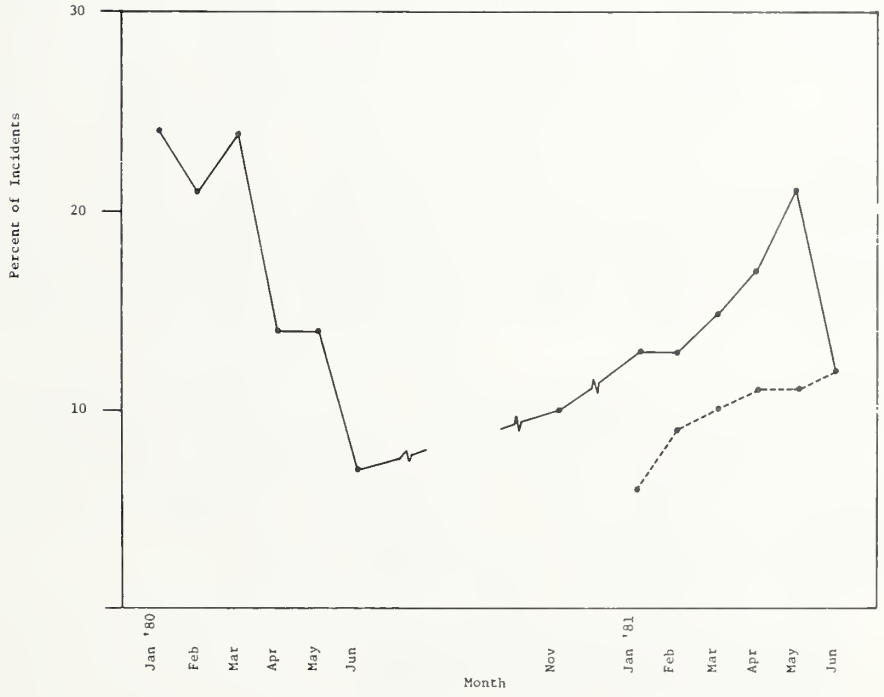
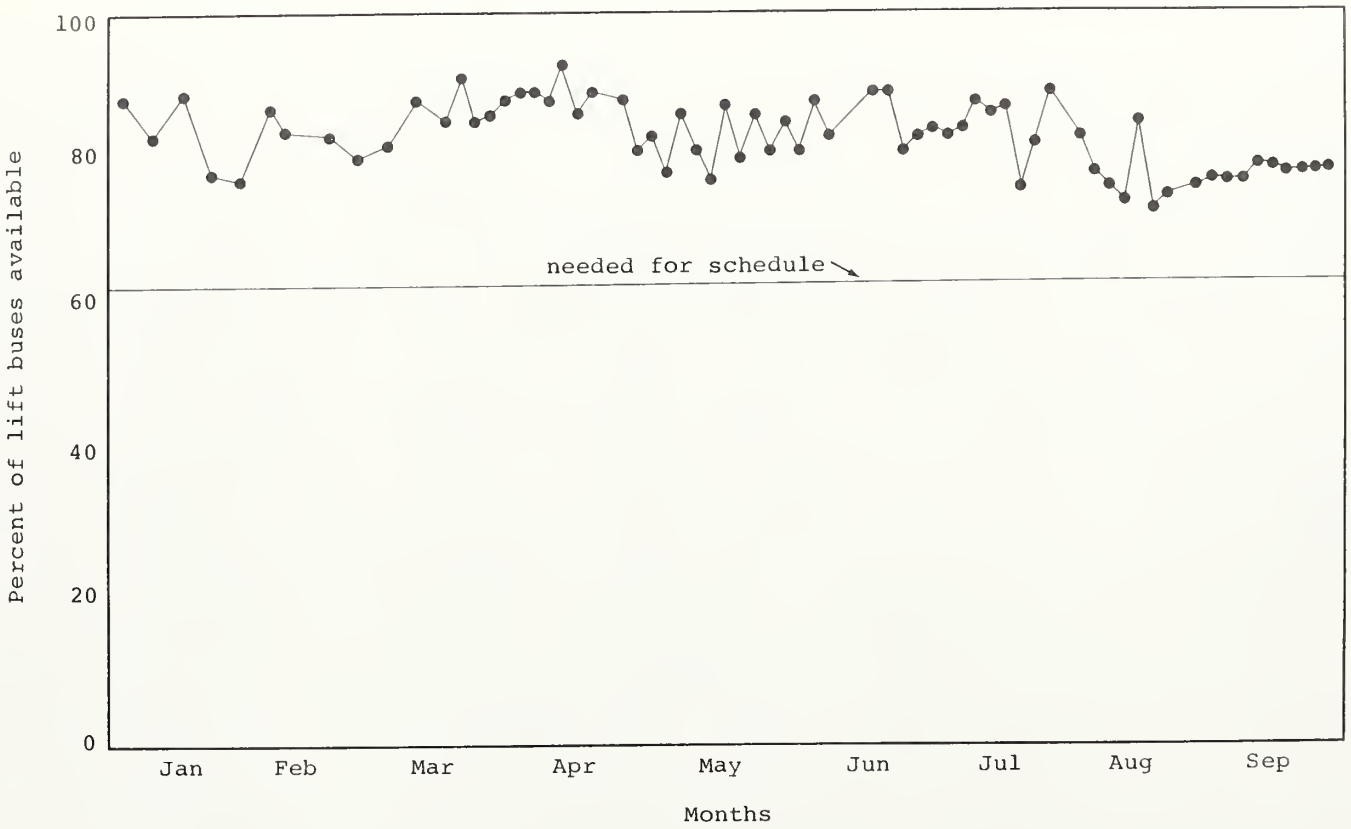


Figure 4-9
SYSTEMWIDE LIFT BUS AVAILABILITY[1]



[1]Based on 7 a.m. semi-weekly Lift Status Reports

Several considerations should be noted with regard to lift-bus availability. Since the reports are based on early morning conditions, they do not reflect problems detected later during the day of the report. Also, individual divisions (i.e., regional garages) may experience widely differing levels of availability despite the fact that the systemwide average is above the minimum. In fact, a few divisions had serious availability problems throughout the demonstration due to both low bus availability and low spare ratios. For example, although Southeastern division maintained an average level of availability of 86.6% (somewhat above the systemwide level), it failed to meet its accessible schedule over 54% of the time due to its low spare ratio of 10.5% (see Figure 4-10). At other divisions, such as Northern and Prince George's, where spare ratios were large, other problems hindered service availability. At Prince George's garage, for example, average availability was quite high for the first four months (averaging 87.6%) but fell in the next five months (62.5%), resulting in a failure to meet the schedule 53% of the time. This was primarily due to the loss of an experienced lift mechanic whose position was not filled.

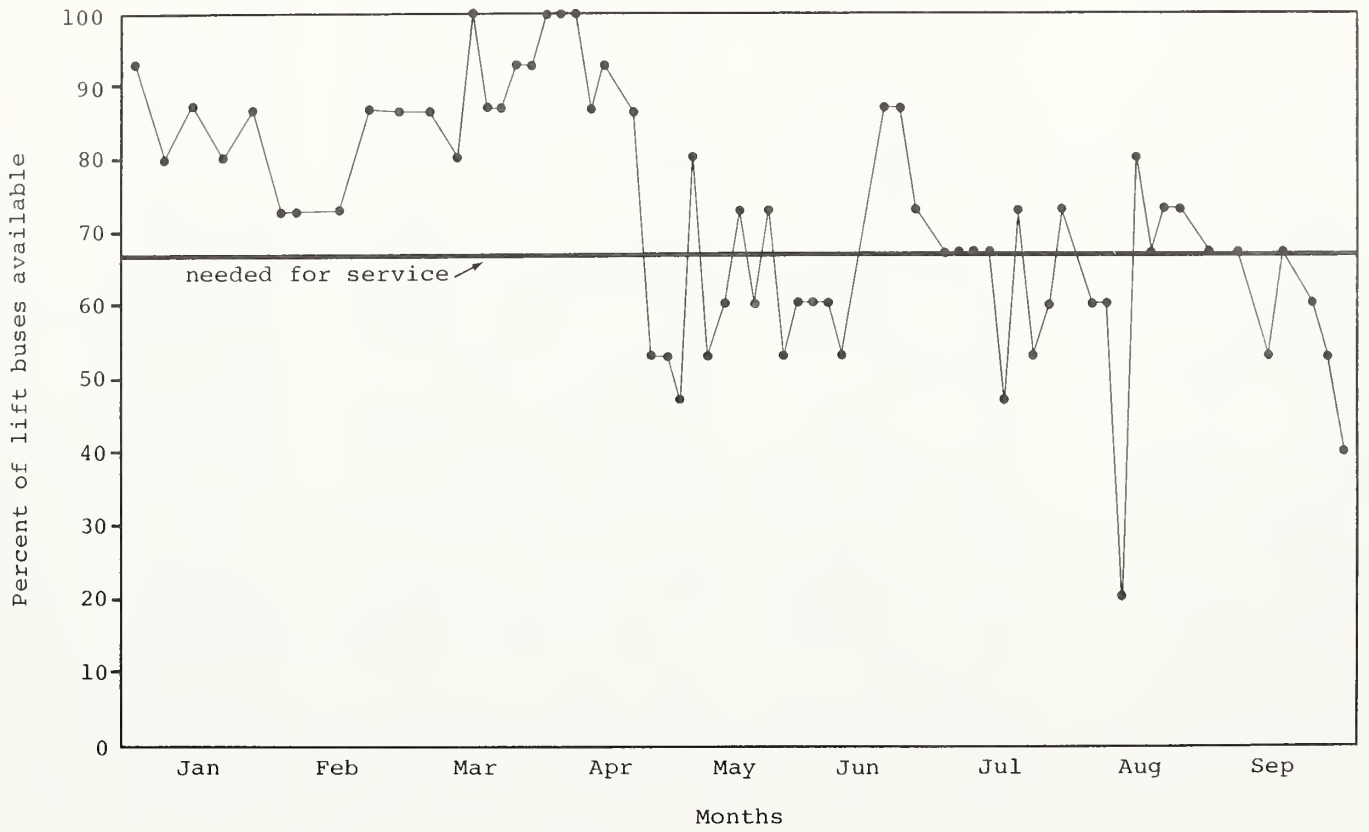
At Northern garage, maintenance problems were attributed to overcrowding, antiquated facilities, wear and tear on vehicles caused by excessive mileage, and poor pavement conditions which cause damage to the lift. Northern division, which has the largest number of lift-buses has maintained an average lift-bus availability of only 64.7% over the nine month period. Due to its greater spare ratio, Northern only requires 54.5% of its lift-bus fleet to be available; nevertheless, availability has dropped below this level on occasion.

Evidence from driver manifests suggests that even when availability at a division was adequate, there were deficiencies in service. This may have resulted from the failure of dispatchers to give priority to accessible runs when making bus assignments. Thus, while spare ratios were adequate on a systemwide basis, there were numerous instances of shortfalls of lift-buses which were exacerbated by the assignment procedures and by the fact that divisions did not (or could not) always borrow spares from others. To maximize effective use of the equipment, the Lift Maintenance Shop Supervisor recommended a reassignment of lift-buses in July 1981; in October some changes took effect in conjunction with reorganization activities in the office of Bus Services.

There appears to have been some confusion over what WMATA's goal for lift-bus availability. According to one source, a goal for lift-bus availability was set, after the transition to a new Director of Bus Services in late 1980, of no more than

Figure 4-10

LIFT BUS AVAILABILITY AT PRINCE GEORGE'S DIVISION[1]



[1]Based on 7 a.m. semi-weekly Lift Status Reports

10% out-of-service systemwide and no more than 15% out-of-service in any division. Reports from late December 1980 to early October 1981, however indicate that the systemwide goal was met only 3% of the time. Furthermore, each semiweekly report has shown at least one division which failed to meet the divisional goal. Another source indicated a goal of no more than 30% out-of-service; this goal has almost always been met. The lack of a single clear goal may have been a factor in the lack of action taken to upgrade service levels.

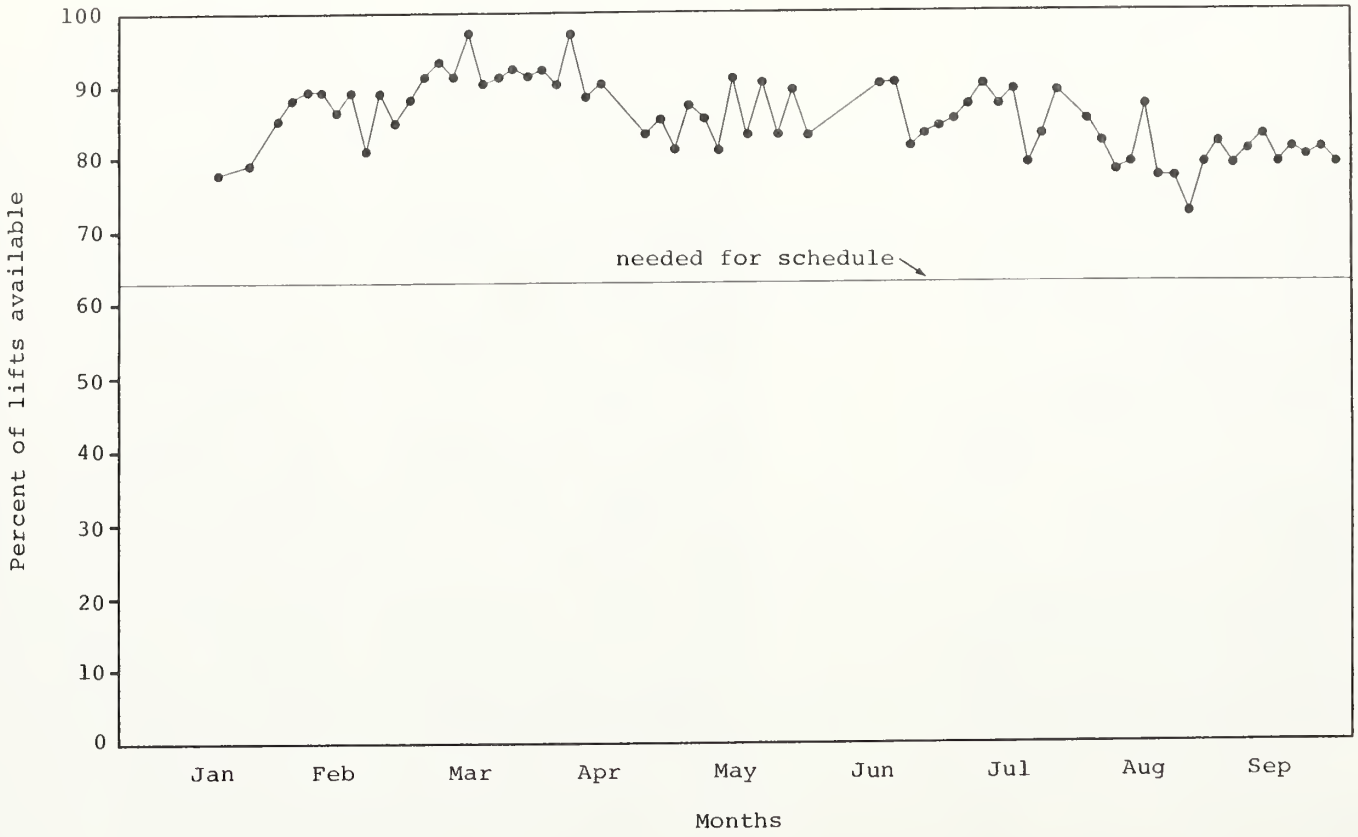
It is important to recognize that the lift-bus availability problems described above are not due solely to malfunctions of the lift equipment. Thus, while the above discussion provides a good picture of how maintenance and reliability issues have affected lift-bus service levels, it does not reflect the reliability of the lift itself. The morning lift status reports indicate that an average of 13.9% of lifts were out-of-service systemwide and that on average they were the cause for 83.0% of the lift buses out-of-service (see Figure 4-11). (Note the trend in 1981 toward increasing out-of-service lifts.) In Milwaukee, similar percentages of lifts are typically out-of-service during winter months (10-15%); however, in summer months only 5% are typically out-of-service. In Washington, availability was, if anything, worse in the summer of 1981 compared to the winter of the same year.

4.5 SUMMARY

WMATA found that "extensive" improvements to the Vapor lift were necessary to correct for design flaws which rendered the lift vulnerable to damage from driver error when operating the device. Following these modifications, satisfactory lift performance was achieved. Yet WMATA was still plagued by high lift repair costs, much of which still derived from accidental damages and driver actions. Driver training and disciplinary measures could possibly have reduced these expensive repairs, yet no such action was taken. A remaining question, therefore, is to what extent additional devices must be incorporated in the lift mechanism to safeguard against driver error.

Given the above lift problems, low availability of service resulted. However, evidence suggests that the availability of lift service need not have been as low as it was. Lift mechanics were not fully utilized in lift repair and maintenance, and were instead diverted to other maintenance tasks, perhaps reflecting the priorities of the management. The preventive maintenance program was not strictly adhered to, and varied

Figure 4-11
SYSTEMWIDE LIFT AVAILABILITY[1]



[1]Based on 7 a.m. semi-weekly Lift Status Reports

from division to division, and over the course of the project. In spite of this, the number of spares was still adequate on a systemwide level to compensate for the lack of operable lift-buses. By reorganizing the fleet to insure adequate numbers of spare vehicles at each garage and to reduce the number of lift buses operating out of antiquated facilities, lift-bus availability could have been improved.

Although mechanics were not fully utilized in the repair of lifts, the total number of lift repair hours expended was substantial and the costs of parts and labor were high. However, the costs were not out of line with those of several other properties experimenting with lift vehicles. While assigning a greater priority to lift repair would have increased costs further, it is possible that repair costs could have been reduced by eliminating the high frequency of accidental damage to the lifts.

5. SERVICE QUALITY AND SUPPLY

The WMATA Accessible Bus Project was aimed at improving accessibility and mobility for handicapped persons by:

1. removing existing barriers for those who previously could not use Metrobus (i.e., increasing the transportation "supply"); and

2. facilitating travel by handicapped persons who can presently use Metrobus but with some difficulty (i.e., improve the quality or "level of service").

These two impacts largely correspond to the wheelchair and non-wheelchair handicapped market groups, respectively. Thus, while the wheelchair handicapped market is the focus of the lift service, non-wheelchair handicapped persons were potentially able to make use of the lift as well. Finally, non-handicapped persons also experienced level-of-service impacts resulting from the project. Therefore, this section discusses the "service" changes for non-handicapped bus riders as well as for the handicapped.

Among the most important service issues for the evaluation are:

1. Whether handicapped persons perceive the fixed-route lift-equipped bus service as "accessible";

2. Whether handicapped persons perceive the service as safe and secure;

3. Whether the lift service is sufficiently reliable for elderly and handicapped people to depend on it for their travel needs;

4. Whether a significant change occurred in the availability of transportation to the handicapped;

5. Whether the new service offers significant improvement in costs and levels of service to handicapped travellers who previously travelled on other modes;

6. Whether accessible Metrobus is perceived differently from accessible Metrorail service; and

7. Whether non-handicapped riders perceive delays and disruption in service due to the operation of the lifts.

The answers to the above questions were developed through analysis of data obtained primarily from surveys of the lift users as well as surveys of wheelchair handicapped non-users, on-board surveys of non-handicapped riders, and other data collected by WMATA.

5.1 COVERAGE AND FREQUENCY OF ACCESSIBLE SERVICE

5.1.1 Coverage and Distribution of Service

During the demonstration period, WMATA's accessible Metrobus service operated on 30 to 38 of the 136 lines operated throughout the metropolitan area. Since each line has several branches, or routes, 69 accessible routes are listed on WMATA's transit service maps -- 34 in the District, 25 in Virginia and 15 in Maryland (see Figure 5-1). (Note that several routes operate across jurisdictional boundaries.) Twenty-five percent of the District routes are accessible compared with 15% in Virginia and Maryland. The percentage of accessible trips on a single route varied greatly, with only two routes totally accessible (one being the D.C. Downtowner Minibus, which was recently discontinued due to withdrawal of special funding from the District). Systemwide, 8% of weekday trips were scheduled to be accessible during the demonstration. On weekends, when service is reduced, accessibility increased on a percentage basis to 17-18% of total trips. In fact, in some of WMATA's eight regional divisions, accessibility occasionally exceeded 50% (see Table 5-1).

The accessible routes were chosen so as to include service in every major corridor of the metropolitan area and to major trip generators for the disabled; however, many non-users reported that a lift-bus stop is not located within a convenient distance from their home. This is the case for half of the total non-user survey group who report that a regular bus stop was within a convenient distance. The fact that all routes are not accessible and that almost half of disabled non-users cannot or are unwilling to travel two or more blocks to a bus leaves many persons unserved.

Figure 5-1

ACCESSIBLE METROBUS ROUTES

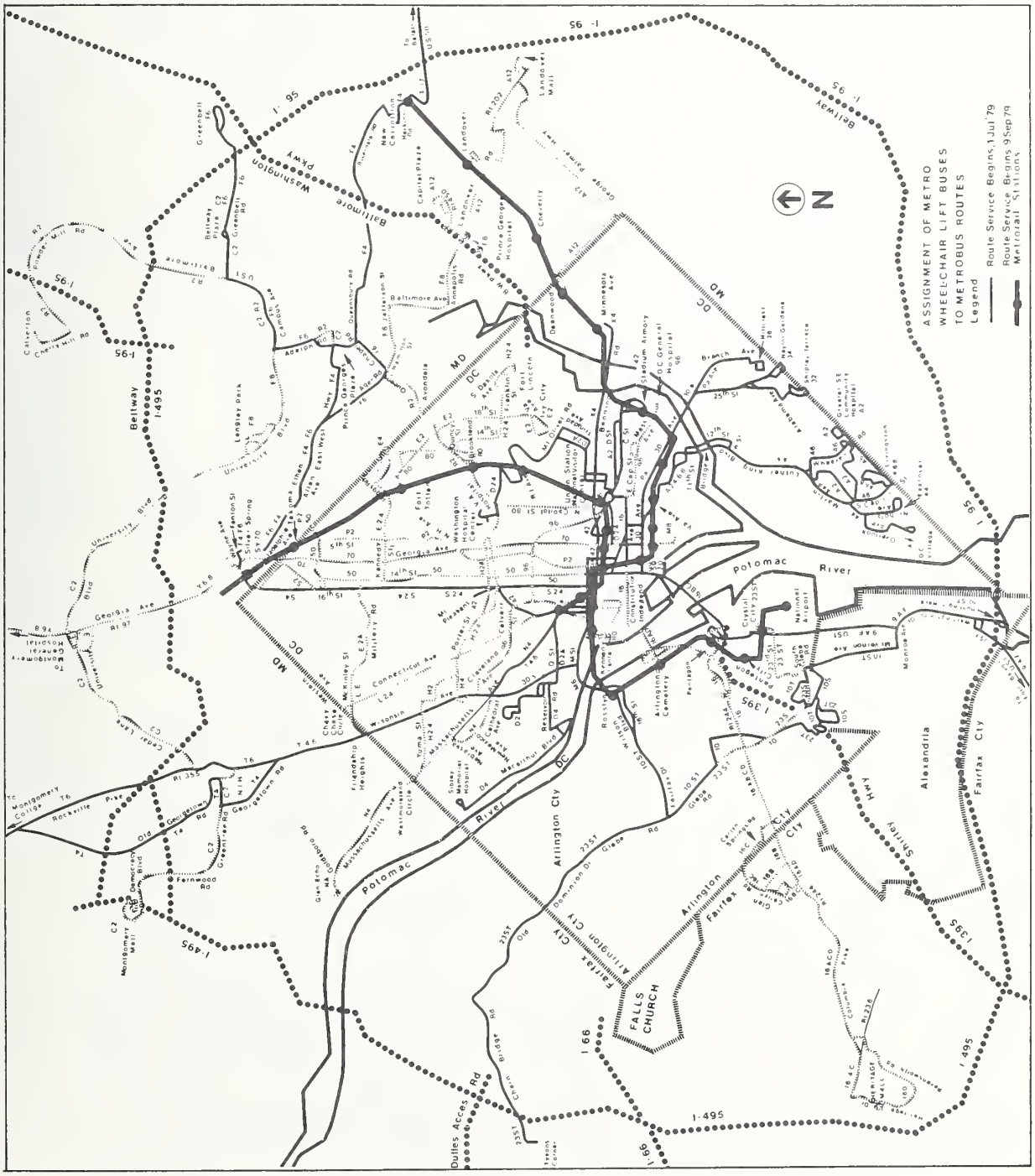


TABLE 5-1. LIFT SERVICE LINES AND TRIPS BY DIVISION
(Sept. 1980)

Weekday Division	Lines* Lift	Lines* Non-Lift	Trips Lift	Trips Non-Lift	% Lift Trips
Arlington	3	15	66	1,301	5%
Bladensburg	7	22	225	4,109	5%
Four Mile Run	4	14	129	1,229	9%
Northern	9	8	318	3,327	9%
Prince George's	3	21	69	1,074	6%
Royal	4	7	109	907	11%
Southeastern	3	12	202	1,326	13%
Western	4	9	168	1,557	10%
TOTALS	37	108	1,286	14,830	8%

Saturday Division	Lines Lift	Lines Non-Lift	Trips Lift	Trips Non-Lift	% Lift Trips
Arlington	2	4	64	445	13%
Bladensburg	7	9	249	2,171	23%
Four Mile Run	3	2	163	189	46%
Northern	9	6	353	1,964	36%
Prince George's	2	12	60	446	12%
Royal	2	5	99	381	21%
Southeastern	1	4	48	879	5%
Western	4	5	192	812	19%
TOTALS	30	47	1,228	7,287	17%

Sunday Division	Lines Lift	Lines Non-Lift	Trips Lift	Trips Non-Lift	% Lift Trips
Arlington	2	3	70	349	17%
Bladensburg	7	9	277	2,621	15%
Four Mile Run	3	2	122	119	51%
Northern	7	6	296	1,336	18%
Prince George's	1	7	18	162	10%
Royal	1	3	34	248	12%
Southeastern	1	3	50	657	7%
Western	4	2	215	424	34%
TOTALS	26	35	1,082	4,916	18%

*There is a total of 136 lines in the system. Because of interlining, the numbers of lift and non-lift lines listed here add to more than 136. The lift service on any one line is out of a single Division, even if that line is served by buses from more than one division. The total of non-lift lines by division has some double-counting of lines, in order to indicate the ratio by division of lift and non-lift lines.

The distribution of lift-buses to divisions (garages) was made to conform to the jurisdictional distribution of peak period transit services. The distribution is not well balanced with regard to spares; some garages have as few as 11% spares while others have as many as 53%. As is discussed later in this section and in Section 4, this had an impact on service reliability.

5.1.2 Frequency of Service

WMATA attempted to provide accessible trips approximately every hour on its accessible routes. Thus, while service is quite frequent for other passengers (e.g., the Pennsylvania Avenue line has headways under 10 minutes), disabled passengers are offered lower frequency service and would be much more concerned about scheduling their trips and about bus service reliability than other passengers. However, the average headway on particular routes is not always one hour nor are accessible trips always scheduled conveniently. For example, service between two sample points on Routes 32/34, the Pennsylvania Avenue Line, was characterized by two hour headways and some inconvenient travel times for peak period travel. On Sunday, however, when fewer total buses were used and when service was less frequent for other riders, the impact of the assigned lift buses on the schedule increased, and accessible service improved to one hour headways. Difficulty in offering high frequency service when most needed is probably an inevitable problem with partially accessible service.

5.2 PROBLEMS USING THE LIFT BUS

Figure 5-2 shows average user perceptions of various potential problems with the lift-bus weighted according to the seriousness of the problem (based on the responses of 20 users).* Users have had little difficulty with the lift or tiedown mechanism and on average rate the service as "good." It is significant that neither fears about personal safety and security nor physical difficulties in using the lift were found to be major problems. The problem most frequently reported was that of being denied entry to a vehicle due to an inoperable lift or non-lift bus. That this has occurred has been borne out by WMATA's records, which show a large number of non-lift buses operating on scheduled lift runs (e.g., as high as 22% in July 1980). Clearly, a significant number of such occurrences poses a formidable problem to lift-users.

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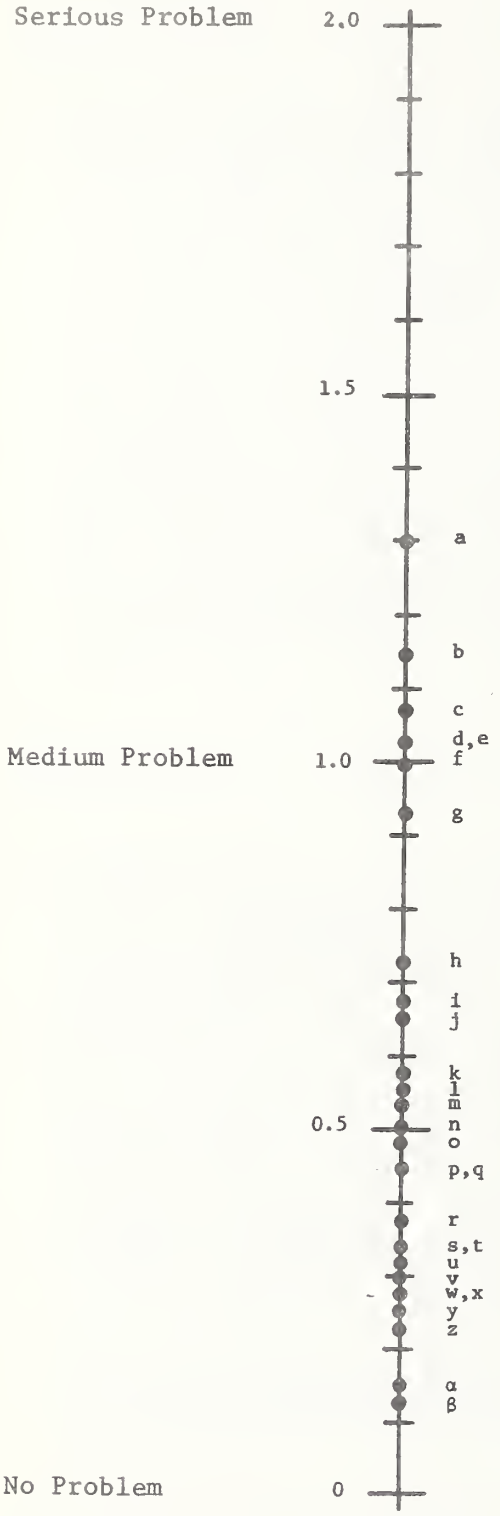
*Using the following scale: 2-serious problem, 1-medium problem, 0-no problem.

Figure 5-2

PROBLEMS LIFT USERS ENCOUNTERED (Average Response)



(a) Entry denied because lift inoperable

(b) Lack of bus shelters

(c) Lack of curb cuts

(d) Getting to the bus in bad weather

(e) Buses not arriving on time

(f) Other

(g) Lack of convenient bus stops/routes

(h) Difficulty getting schedules

(i) Buses not stopping at curb or accessible location

(j) Grab rails inadequate

(k) Maneuvering to the wheelchair position

(l) Crowds in the aisle

(m) Fear of inability to leave bus in an emergency

(n) Driver assistance and courtesy not helpful

(o) Priority seating for handicapped/elderly not effective

(p) Bus driver moves the bus too soon, lose balance

(q) Non-wheelchair passenger seated in wheelchair location

(r) Getting onto the lift platform

(s) Feeling safe getting to the bus stop

(t) Securing the wheelchair

(u) Once in position fear of wheelchair rolling while bus is in motion

(v) Attitude of other passengers

(w) Feeling secure on the lift

(x) Feeling safe in the bus

(y) Fear of crime on the bus

(z) Bus ride is uncomfortable

(α) Wheelchair location already occupied

(β) Using the farebox

Other frequently identified difficulties related to getting to the bus or waiting for the bus rather than using the lift or riding the bus. Specifically, lift-users noted the lack of bus shelters and curb cuts, getting to the bus in bad weather, buses not arriving on time and the lack of convenient routes or stops as key problems. Note that many of these are also common complaints of able-bodied riders. Finally, users perceived that at least some other passengers were annoyed by the delays caused by lift operation: 32% noted that "quite a few" other riders were annoyed.

5.3 ACCESSIBLE SERVICE RELIABILITY IMPACTS

One of the key level of service characteristics perceived by transit riders is service reliability. Typically, this means the adherence to advertised schedules; that is,

1. a vehicle is available at the time and location indicated; and

2. the travel time is as advertised within an acceptable tolerance.

Accessible bus service impacts reliability both for lift-users and other bus riders. For lift-users, the definition of reliability takes on an added dimension, in that an on-time vehicle arrival is not sufficient to meet the advertised schedule -- it must be a lift vehicle and the lift must work. In the Washington, D.C. accessible bus project, this aspect of service reliability was frequently deficient.

As a result of poor lift availability (as described in Section 4), accessible service was not provided in full accordance with the advertised schedules.* Many scheduled accessible trips were operated with non-lift buses or with lift buses that had inoperable lifts. While lift ridership was low enough so that many of these non-accessible trips went unnoticed (particularly since division superintendents were reportedly aware of which runs typically had riders and assigned buses accordingly)

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*It appears that WMATA had the means to improve the availability of service to lift-users by: (a) reallocating spares among divisions, (b) encouraging borrowing among divisions, and (c) insuring that available lift-buses were only assigned to accessible runs. Despite some improvement in the latter portion of the project period, much of the reliability problem persisted.

the failure to meet the schedule is an important indicator of the severity of maintenance difficulties as well as a serious service deficiency limiting the potential for increased ridership.

Drivers of scheduled lift runs were asked to record on their manifests whether the bus was lift-equipped and, if so, whether the lift was operable. Manifest reports from 12 sample weeks from May 1980 through August 1981, show that, on average, only 78% of accessible bus runs (driver assignments) were successfully provided with operable lift-buses.* In fact 14% of accessible runs were operated with non-lift buses (see Figure 5-3). This occurred despite the fact that systemwide bus availability was sufficient to meet the schedule. However, the statistics are not constant over this period, and conditions improved somewhat in the latter part of the period: in 1981, 81% of accessible service was provided and about 13% of accessible runs operated with non-lift buses.

While in most cases missed accessible runs did not inconvenience lift passengers (due to low ridership), there were nevertheless several instances of denials of service due to malfunctioning lifts or use of non-lift buses on lift runs. Systemwide, the number of denials ranged from 1 to 10 per week and were more frequent in the summer and early fall of 1980. While their numbers may appear small, they represent between 2 and 20% of attempted trips during each sample week (see Figure 5-4).

Lift-users were keenly aware of the reliability problem. According to the surveys, the most serious problem users experienced with the lift service was being denied service because of an inoperable lift. More than three quarters of all lift-users experienced this problem at least once. It was most likely their experience with the lift service reliability that caused a similar number of lift-users to indicate that "better design of the lift" is needed, despite few indications of actual physical difficulties with the lift.

Finally, surveys indicate that most drivers had problems operating the lift "a few times" and almost one in three reported having problems 25% of the time or more. Nevertheless, their overall assessment of the reliability of the equipment

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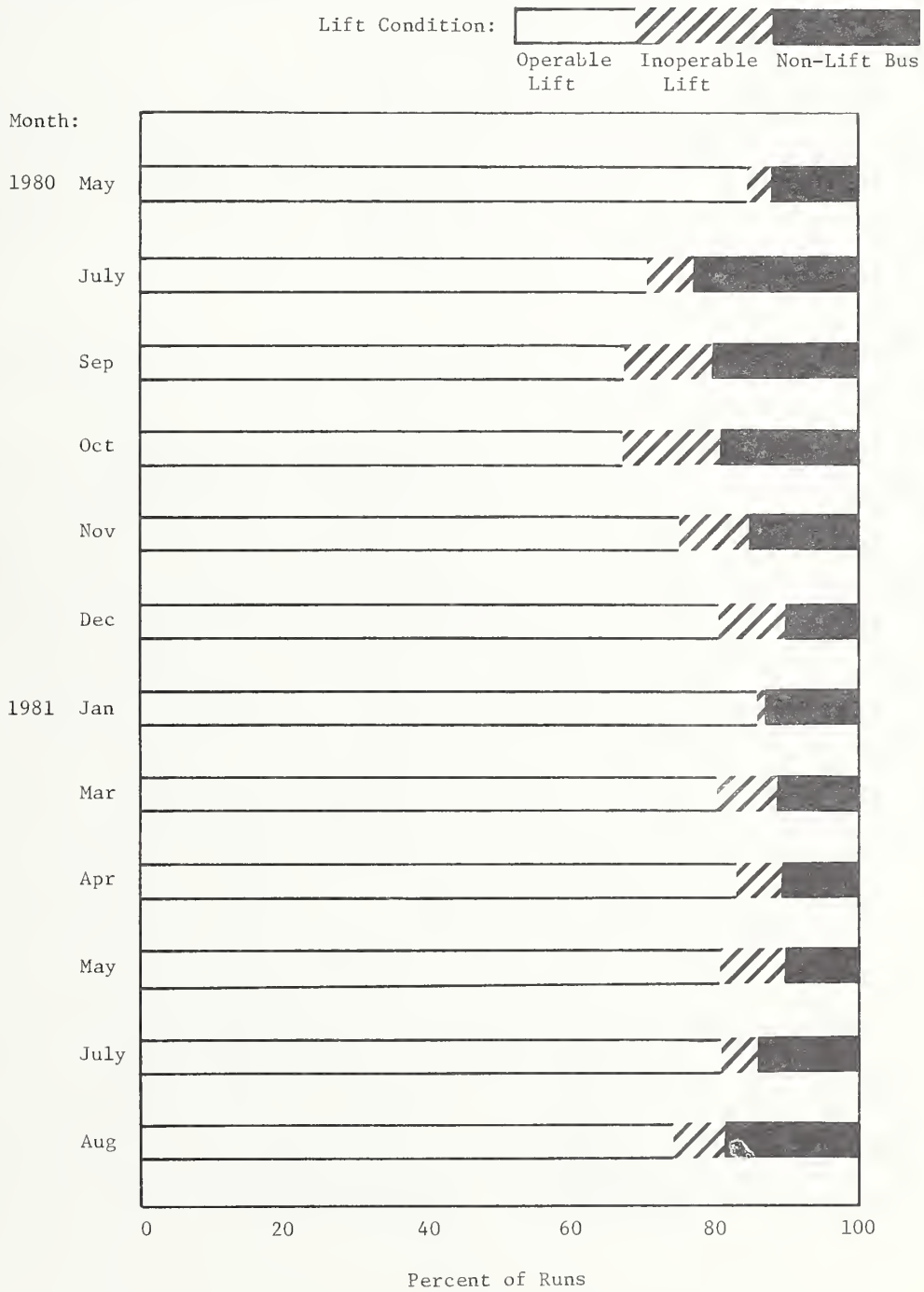
*Note that in the discussion of operations, a block is defined as a bus assignment, a run as a driver assignment, and a bus trip as the vehicle's traversing the route. Since only 74-95% of manifests were turned in, it is possible that the percentage could have been higher or lower depending on whether there was a response bias.

Figure 5-3

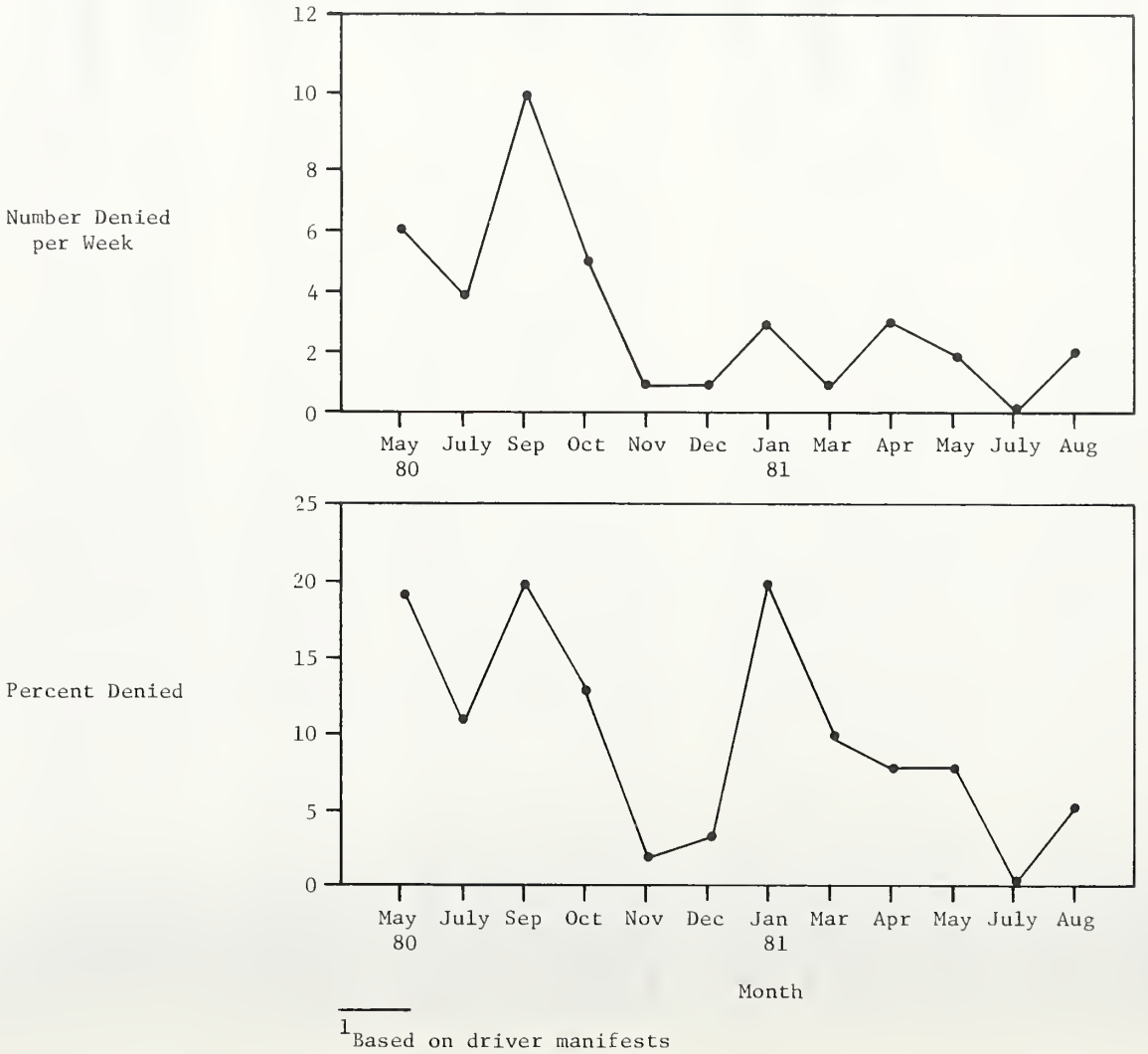
LIFT SERVICE RELIABILITY[1]



[1]Based on driver manifests

Figure 5-4

NUMBER AND PERCENT OF TRIPS DENIED



[1]Based on driver manifests

was mixed, with as many drivers saying the lift was "basically reliable" as those who said it was "basically unreliable."

Presumably as a result of problems with the lift and the time consumed in its operation, most lift drivers indicated that they believed the lift has adversely affected service reliability (almost one of every four drivers said "considerably"). Despite the report of difficulties with the lift, and its perceived negative impact on reliability, a surprising 36% of drivers believed WMATA's image had improved as a result of the lift project, while only 8% said it had deteriorated.

Non-lift drivers were somewhat more likely to say that the lift had adversely affected reiliability and WMATA's overall image. For each non-lift driver who thought WMATA's image deteriorated there were 1.7 who felt it improved while for each lift driver who thought the image deteriorated there were over 4 lift drivers who thought it improved.

5.4 CONVENIENCE OF THE LIFT BUS SERVICE

There is evidence from the survey that a reliable lift service nearby would be perceived as a convenient means of travel. Lift-users were, of course, most likely to perceive fixed-route lift-equipped service as a convenient travel mode. Work/school trips were found to be the trip purposes for which the lift-bus was most suitable--73% said it was a convenient mode for these trips and an additional 20% said it "sometimes was." Only 6% said it was not convenient. Shopping and medical trips were perceived to be more difficult on this mode--18% and 20%, respectively, said it was not convenient to use the lift-bus for these trip purposes. This seems logical since shopping trips usually involve packages and medical trips might require direct and rapid transportation. "Other" trips--probably personal business and social/recreational trips--were perceived to be more suited to lift-bus travel--57% said it was a convenient mode and 41% said it was sometimes.

Eighty-six percent of lift-users said they were located conveniently to Metrobus (based on their own definition of convenience). Almost three-quarters of those located near a bus stop said they could catch a lift-bus at the stop. Interestingly, 12% of respondents were not sure whether the nearby bus stop was a lift-bus stop; perhaps these users rode the bus within the downtown area rather than from their home. While 12% may not seem like a very large percentage, it is a surprisingly large portion of lift-users. It suggests the need for marketing oriented toward providing the information needed to use the system.

The fact that 47% of lift-users without direct access to Metrorail can now access it with Metrobus seems to suggest that accessible Metrobus could potentially have a significant impact on use of Metrorail by disabled people. Although more than half of lift-users made use of the lift-bus to get to the rail service,* the total number was too low to have a noticeable impact.

Overall, almost half of those surveyed rated the service as "good." Despite this and the fact that the specific problems users experienced were very much due to its scheduled and fixed-route nature, more than two-thirds of the surveyed users said they would not prefer a door-to-door service. While controversy over how to provide accessibility continues, very few of those surveyed were undecided on this question; of course it should be kept in mind that this is a sample of lift-users rather than a random sample of disabled people.

Non-users generally believed the service would be a convenient means of travel (especially for work/school trips). However, many indicated that they perceived poor schedule adherence, frequent lift malfunctions and inadequate driver skill to be characteristic of the service. Non-wheelchair individuals encountered during the second round of surveys, which included more elderly, female and lower income people, had the most favorable attitude towards lift-bus service, perhaps reflecting their greater transit dependence.

The vast majority of non-users believed they were physically able to use the lift-equipped Metrobus, although some believed they would need assistance from an escort. Of those individuals who used a wheelchair, only 7% did not feel they were physically able to use the buses, and another 15% were unsure. Non-wheelchair non-users were even more likely to say they could use lift buses.

5.5 LIFT-USER SAFETY AND SECURITY

5.5.1 Perceptions

Safety and security are important issues to all passengers; it was suspected that more vulnerable elderly and handicapped travellers may be even more concerned with these issues than the average passenger.

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*During the week before the survey, 15 lift users made trips on the lift-buses; eight reported that some of their trips involved transfers to Metrorail and another four did not answer the question on transfers.

Lift users' concerns about safety and security were expected to focus on the safety of the lift and tiedown devices, bus driver skill and street and in-vehicle crime. However, survey results showed that these were only minor problems. Inability to leave the bus in an emergency was the greatest problem of six potential problems related to safety and security included in the survey. Similarly, among non-users, fears for physical safety were not substantial problems.

5.5.2 Accident History

A few accidents involving lift-users were reported during the project period, with the first occurring in February 1980, over six months after service was initiated. The accident involved a paralyzed electric wheelchair user who fell "headfirst to the sidewalk"* while disembarking from a Metrobus, but fortunately was not seriously injured. While an offical WMATA spokesperson indicated that the accident was likely caused by a mechanical malfunction, a passenger indicated that it appeared that the driver did not know how to operate the lift. The handicapped passenger, a regular rider, apparently had to explain how to operate the lift.

A second incident was similar in some respects, and also involved an individual in a power-drive chair who was disembarking. In this case the lift was only about 6 inches off the ground and as a result there were no injuries to the passenger.**

Finally, a third incident involved the lift dropping quickly through the last few inches of its descent. No injury occurred but the wheelchair was damaged.***

5.6 METROBUS VS. METRORAIL LEVEL OF SERVICE

Washington, D.C. is unusual in having a totally accessible rail service in addition to the accessible bus service initiated with this project. Contrasting the perceptions of these two services by both users and non-users offers valuable insights, particularly since the high cost of making older rapid

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*"Man in Wheelchair Hurt in Metrobus Lift Accident", The Washington Post, February 16, 1980.

**Telephone conversation with Anne Marie Barry, George Washington University RT-9.

***Telephone conversation with Betty Revis, WMATA.

transit systems in other cities accessible has led to suggestions that accessible auxiliary fixed-route surface transit be provided instead.

As with Metrobus, equipment reliability and availability were the key issues concerning Metrorail; in response to a survey question on difficulties using the service, "elevators not reliable" topped the scale by a wide margin. Other problems noted included fear of inability to get out of the vehicle or station in an emergency, and fears of accidents and of crime. Perhaps noteworthy is the fact that a greater degree of seriousness was noted for these "fear" factors on Metrorail than on Metrobus. One possible contributing explanation would be the accidential death of a blind passenger in the Metro during the study period. However it is possible that Metrorail is perceived as a more dangerous environment than the bus because in the latter: (a) a driver is available for assistance; (b) there are no platforms; (c) vehicle speeds are (or may appear) slower, and (d) passengers are above ground at all times.

It also appears that perceived availability and use of Metrobus and Metrorail are correlated. Users of the lift-bus seem more likely than non-users (49% vs. 19%) to perceive Metrorail as a frequently available mode. They also seem more likely to use Metrorail (44% of lift-users reported that they had made trips on Metrorail during the previous month vs. only 9% of non-users). This is despite the fact that non-users reported Metrorail stops as equally or more convenient.

5.7 IMPROVEMENTS NEEDED TO THE LIFT-BUS

When asked which of several improvements are most needed to enhance the lift-bus, users noted "greater public awareness" and "curb cuts" as the most important improvements.* Greater public awareness, which was meant in the survey to imply greater sensitivity to disabled people, may have been interpreted by respondents to mean more active marketing of the service. Curb cuts are clearly needed to remove a major remaining barrier to the use of fixed-route service. However, curb cuts do not fall under WMATA's jurisdiction. An obvious conclusion borne out by the survey is that a program of curb cuts coordinated with local jurisdiction would greatly enhance the potential of accessible fixed route-bus service.

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*Improved reliability was not one of the improvements suggested by the survey form, although it was a a significant problem according to the users.

5.8 IMPACTS ON THE ABLE-BODIED METROBUS RIDERS

Delays due to lift operation have often been suggested by opponents of fixed-route accessible bus service as adverse impacts that accessibility would have on other riders. These delays could result from normal boarding times of lift-users for which time may not have been adequately built into the schedule, or to a mechanical or other difficulty with the lift which resulted in excessive dwell time at the bus stop. This potential impact is important because it has been a widespread concern of operators. Furthermore, since any displeasure on the part of other riders caused by such delays might also be sensed by disabled users and could be a considerable deterrent to their use of the system, it was considered important to question disabled as well as able-bodied riders about this issue.

Driver measurements of boarding and alighting times averaged 3.3 minutes for boarding and 2.9 minutes for alighting.* However, the standard deviation of this measurement has been estimated at about 1.5 - 2.0 minutes, indicating wide variation in the observations. Although these boarding and alighting times are large enough to affect the schedule, the lift ridership rate has been too low to justify taking time checks to precisely measure the resulting impact. It is believed that service, on average, has been only marginally affected by lift boardings and alightings due to the low lift ridership level. However, drivers responding to a survey generally believed that the lift had caused service reliability to deteriorate -- nearly 60% said lift problems have affected reliability while only 16% said they had not.

The driver survey also provided an opportunity to obtain third-party observation of the interactions between disabled and able-bodied passengers. While generally these interactions were positive, a significant percentage (38%) of the drivers noted problems such as impatience, negative comments or ridicule. Drivers most often reported "no response" to characterize the reaction of the disabled passenger in the face of such adversity.

Nearly all able-bodied riders responding to a survey were aware of the lift service, although a substantial percentage (32%) had never seen the lift in operation. The greatest number of people found out about the lift service either by

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*These observations, recorded for one week during almost every month of the study period, were rather subjective and may not represent precise measurement of boarding and alighting times.

seeing the lift in service or by noting the symbol on the bus exterior. Of those who had witnessed lift operation, about half had seen the lift in use 10 or more times (over the 23 months of its operation). Travelers during midday were least likely to have seen much lift operation; this corresponded with ridership counts which indicated only limited lift usage during this period.

When these other riders were questioned directly about their view of the lift's influence on service, it appeared that from their point of view the lift has had a substantial impact on the schedule. Half of all passengers who had seen lift operation perceived significant delays in travel time. A majority of these people reported the average delay as 5 minutes or more. Even more important, however, is the fact that 44% of the surveyed people who had viewed lift operation perceived the longest delay to be 15 minutes or more. In spite of this, relatively few said they would not travel on lift-equipped buses as a result of delays. However, investigations of variations in responses by time of day revealed that passengers surveyed during the afternoon peak (3:30 to 6:30 p.m.), who reported the greatest familiarity with the lift in operation,* were also most likely to perceive long delays due to lift operation. These individuals also were most likely to refuse to ride a bus that was on an accessible run.

Whether or not passenger estimates of delay due to lift use are accurate (and driver records suggest that perceived time was greater than actual), a number of riders appeared to avoid accessible runs. One implication of this behavior is that increasing lift use by disabled persons could disrupt existing service sufficiently to result in loss of ridership. (The fact that most able-bodied riders surveyed, will walk only a very short distance to reach a bus stop indicates that these travelers are quite sensitive to convenience.)

Unfortunately, the on-board survey results did not allow a full exploration of lift induced diversions of able bodied riders, particularly since the survey did not reach travelers who no longer rode on accessible runs or used transit (because of perceived schedule delay due to accessible service). Some efforts were made to identify riders who had switched to other runs by surveying at times when accessible buses were not scheduled. However, only a small number of responses were obtained (i.e., 28, or 12% as many as the same sample group surveyed on accessible runs), thus limiting the ability to draw

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*Ridership figures confirm that the greatest number of lift boardings take place between 3 and 4 p.m. and between 6 and 7 p.m.

conclusions. Nevertheless, a greater proportion of riders on the non-accessible buses claimed to avoid accessible trips, possibly suggesting that riders are in fact modifying their travel behavior to avoid lift trips.

About half of the on-board survey respondents provided written comments on the lift service. Forty-five percent expressed approval of the service, while eleven percent disapproved. Approval of lift service was most frequently based on social principle. Disapproval of the service arose from mixed grounds and included considerations of costs, service delays, low utilization, and a high level of operating problems. Of problems identified, the quality of maintenance, of operator training, and of lift equipment design were most frequently named.* Very few respondents suggested that the disabled be served by an alternate system. Probably the low rate of lift ridership is one factor responsible for the lack of a more negative overall reaction. Note that almost all passengers indicated that they would give up their seat to a wheelchair user.

Data from the surveys of lift-users and of WMATA bus drivers confirmed the on-board survey's implication that some able-bodied riders were displeased with accessible service. The surveys of lift-users indicated that they perceived some negative reaction on the part of other riders: 32% reported that "quite a few" other riders were annoyed and 39% said "very few", while 26% answered "no" to the question.

5.9 SUMMARY

From the point of view of the user and the potential user, the quality of the accessible bus service was lacking in several respects. One of the outstanding problems was poor reliability. The incidence of non-lift buses and inoperable lifts on scheduled accessible trips resulted in a denial rate of about 10%. This was the foremost complaint of users. Making it difficult for users to depend on the service, poor reliability likely discouraged ridership by those who had tried the service as well as by those who never tried it.

Inconvenient routes and schedules and difficulties in getting to the bus stop were other major reasons why disabled people did not use the service. Many persons were unwilling to travel the distances necessary to reach a bus and preferred

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*Memo from Betty Revis, WMATA, July 10, 1981.

alternative modes. In contrast to reliability, coverage and frequency of service are more issues of design rather than of operations and performance. Because the project was designed as an experiment, WMATA was constrained by a limited amount of equipment. In addition, there were jurisdictional constraints in distributing the available vehicles to routes. The result was a system of both limited coverage and low frequency. Survey results suggest that a higher frequency service or a different selection of routes might have resulted in a service better suited to travel needs. Clearly, there are questions remaining about the viability of the concept of "partially accessible" fixed-route bus service.

Environmental barriers such as curbs and major streets also stand out as a key issue; both users and non-users indicated the importance of curbs as barriers to using the bus. While WMATA had little control over these barriers, they remain significant hurdles to be overcome if any fixed-route accessible service is to be successful.

Finally, it appears that fears about physical abilities and safety and security using the bus are less important issues. Users had little difficulty with the lift mechanism and most non-users felt they could physically use the lift-bus. While training programs may encourage greater ridership by disabled individuals and help them overcome any fears they do have, it appears that access to the bus stop and reliability of service overshadow these problems.

In conclusion, while users favored a fixed-route service over a separate door-to-door system by 2 to 1 and while even many non-users believed fixed-route service to be a convenient means of travel <u>if a bus stop were located nearby</u>, the surveys suggest that areas without very dense transit networks will not be able to rely solely on fixed-route service to meet mobility needs of disabled people.

6. TRAVEL BEHAVIOR

Since improving the mobility of the transportation handicapped through accessible fixed-route transit is the major objective of the project, the response of handicapped persons to the service was a key aspect of the evaluation. The most important travel behavior issues are:

1. Were significant numbers of transportation handicapped people able and willing to use a fixedroute bus service equipped with lifts?

2. Which subgroups of the transportation-handicapped population remained unserved? Why were these groups still unable to use the service?

3. Did the implementation of such a service significantly affect their mobility?

These issues are discussed in the Sections 6.2 through 6.9. First, however, several issues are discussed relating to the collection of data used to evaluate travel behavior impacts.

6.1 DATA USED IN THE TRAVEL BEHAVIOR ANALYSIS

Two primary sources of information were used in the analysis of travel behavior issues: driver manifests and rider surveys. Driver manifests, collected for one sample week each month during the project period, were the source of lift ridership data, including the number of users, whether or not they were in a wheelchair, the route and time of boarding, and a driver estimate of the boarding and alighting time required by the passenger. However, while service began on about half the routes in July 1979 and was completely in place by October 1979, driver manifest records produced before May 1980 are not considered reliable. During this period, approximately 85% of the manifests were maintained, implying that actual ridership may be as much as 20% higher than reported.

As a check on driver-reported ridership figures, a follow-up phone call was made to lift-users who participated in the

survey (which is considered to have included nearly every lift-user); it revealed that these individuals reported almost twice as many lift trips on Metrobus during the sample week as were recorded by drivers. After examination of the routes utilized by these passengers, it appears that the discrepancy was due to inadequate reporting from only one division and that ridership, at least in May 1981, was actually higher than recorded by WMATA. It is not known whether the previous ridership counts suffered from the same problem.

The survey effort included in-depth interviews of disabled lift-users and non-users, as well as on-board surveys of other riders. While WMATA conducted the on-board surveys, George Washington University's Rehabilitation Research and Training Center (RT-9) was responsible for identifying disabled persons for the survey effort, conducting the interviews and coding and keypunching the survey data.* Since users and non-users were so difficult to identify, random sampling methods could not be used to obtain survey sample populations. Instead, extensive agency, organization and employer contacts were used in the hope of reaching both current and potential lift-users.

Surveys were administered in two rounds: the first took place in May and June 1980; the second occurred during the period from October 1980 to February 1981. For the second round, slight modifications were made to the survey instrument and more substantial changes were made in the survey administration procedure.

During the first round, some lift-users were identified directly by WMATA while others were located in the course of conducting the non-user survey. Disabled individuals (primarily non-users) were contacted with the help of agencies and employers who distributed mailback surveys. The responsiveness of employers, many of which were government agencies, led to a biased sample (particularly of non-users) which tended to omit unemployed, less mobile segments of the community.

During the second round, efforts were made to correct the imbalance in the sample by focusing on social service agencies serving senior citizens and inner-city residents. A wide variety of agencies were contacted and group (cluster) interviews scheduled to take place at the agency sites. Table 6-1 summarizes the involvement of area agencies and organizations in the

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*GWU RT-9 received an UMTA SMD grant to perform these surveys as well as to develop training programs for drivers and consumers, to train driver instructors and allied health professionals, and to perform an engineering assessment of the special equipment.

TABLE 6-1. AGENCIES AND ORGANIZATIONS PARTICIPATING IN THE SURVEY SAMPLE IDENTIFICATION EFFORT

Type of Agency/Organization	Numbers Involved	Surveys Obtained
Round 1		
Physical Medicine and Rehabilitation, Social Service and Outpatient Dept.	28	
Residential Facilities	3	
Governmental Agencies	27	
Universitites (Primarily employers)	9	
Private Employers	11	
Handicapped Advocacy Groups	5	
GWU-identified Individual	1	
WMATA-identified Individuals (also encountered above)	11	
		115*
Round 2		
Senior Adult Centers	6	41
Advocacy Groups (1 mailing)	7	29
School Systems	2	29
Rehabilitation Organization (mailing)	1	6
Sheltered Occupation Center	1	4
TV/Radio Public Service Announcements	N/A	6
Newspaper Spots	N/A	4
GWU-identified Individuals	N/A	44
		163

*During Round 1, 238 user and 688 non-user surveys were distributed to agencies. It is not known if all of them were actually distributed to individuals; thus, it is difficult to calculate the mailback response rate.

identification efforts. Additional efforts were made to have disabled persons identify themselves: some agencies sent flyers to their clients advising them of the survey; in addition, public service announcements were aired on radio and placed in newspapers. Respondents to public service announcements and agency flyers were often interviewed by telephone. One individual was interviewed in person on a one-to-one basis at a worksite. Over half of the respondents filled out surveys on their own, while the remainder needed assistance and/or to have the questions and answers read to them. (This was obviously the case for telephone interviewees.)

A goal of 250 wheelchair and 250 non-wheelchair non-users and as many lift-users as possible (up to 250) was established at the outset of the survey effort. The first round resulted in 28 lift-users, 20 of whom were wheelchair users, and 87 non-users, 31 of whom were wheelchair users. The total first round response was significantly below the target. The second round identified 24 lift-users, 18 of whom were wheelchair users and 142 non-users, 62 of whom were wheelchair users. Thus the entire user sample was 52 and the non-user sample 229. Tables of survey results are included in Appendix B.

6.2 RIDERSHIP

6.2.1 Lift Boardings

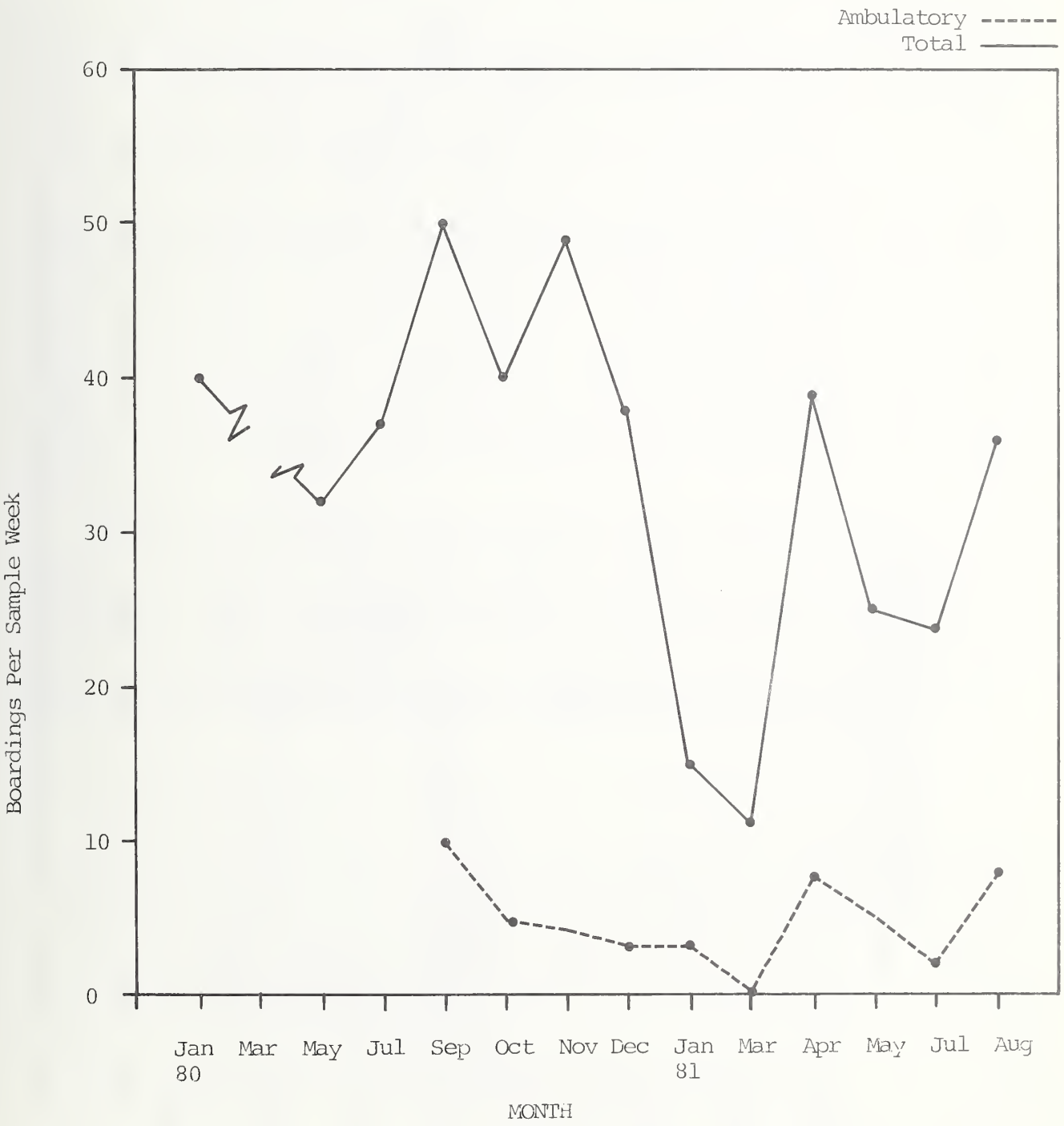
A simple but key measure of effectiveness of the lift-equipped Metrobus service is the lift ridership. Ridership on the lift was 30 to 50 trips per week until winter 1981 when ridership fell to 10 to 15 weekly trips. In the spring of 1981, however, ridership made a slight rebound (see Figure 6-1).

There is some concern as to the accuracy of the ridership counts, since a check on one sample week revealed substantial under-reporting. Even if there were frequent under-reporting, the proportion of total riders who use the lift remains miniscule. Reported lift ridership represents about one thousandth of one percent of total Metrobus ridership (see Figure 6-2).

To enable an assessment of the level of use of the lift by ambulatory individuals, beginning in September 1980, drivers recorded lift use by non-wheelchair passengers separately. Some transit authorities operating accessible buses (e.g., 16 of 42 contacted by the Transportation Systems Center) restrict lift use to wheelchair users due to concerns over the safety of lift use by standees, and the size of the potential ambulatory

Figure 6-1

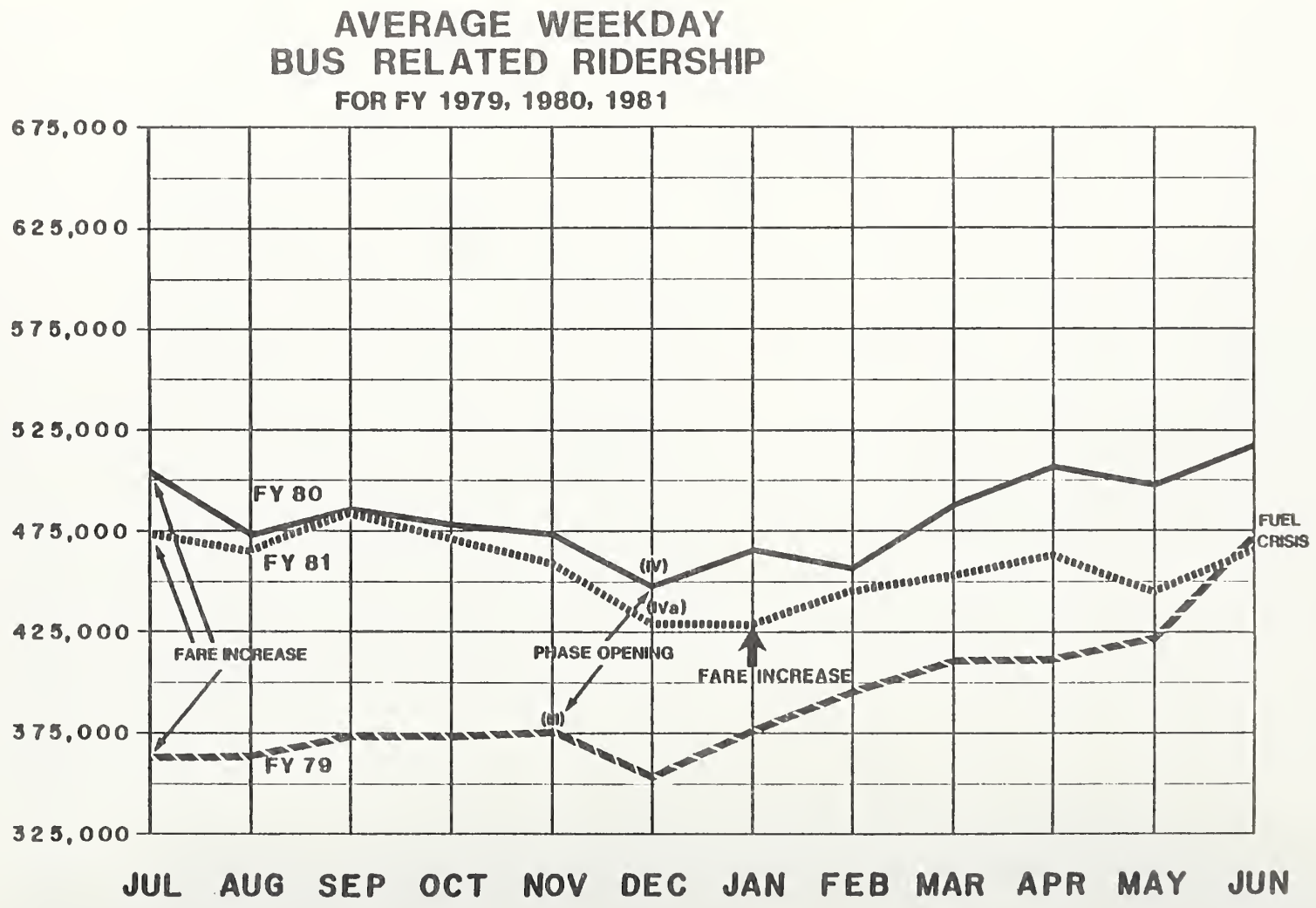
LIFT RIDERSHIP[1]



[1]Based on Sample Week Manifests

Figure 6-2

TOTAL METROBUS RIDERSHIP



Source: WMATA Quarterly Metrorail and Metrobus Ridership Report, September 1981

user group. However, these did not prove to be major problems during the demonstration. On average, only one of seven lift-users on Metrobus was ambulatory. Thus, making the lift available to ambulatory users did not result in a major relative increase in lift use which disrupted schedules. Use of the kneeling feature designed specifically for ambulatory disabled and elderly, was recorded during two sample weeks in May and July 1980 and was found to be surprisingly low -- 5 users in May (compared to 32 lift-users) and none in July. However, one possible factor contributing to the low utilization of the lift and the kneeling feature may be the smaller size of Washington's elderly population; thus, in areas with larger such populations, the concerns about providing lift-service to the ambulatory might still prove valid.

On an average weekday there are approximately 1300 accessible bus trips driven by about 350 drivers. Given the average weekly ridership of approximately 40 and recognizing that most of these trips are made during weekdays, the chance that a lift-user would be encountered on any given bus trip was approximately 1 in 200, while the chance of a lift-user on any given driver assignment can be estimated as less than 2 in 100 (assuming uniformity of demand, which of course is not the case). Since many trips are made by a few people who travel on the same route at the same time each day, it is clear that the chances of picking up a lift-user are even less for many lift-bus drivers.

WMATA's low lift ridership levels may be attributed to several factors, including the limited coverage of the accessible service and its poor reliability. Recall that the schedule called for only about one-fifth of the routes and only about 8% of all Metrobus trips to be accessible; on average, only about 78% of these were provided with operable lifts. Given infrequent and inaccessible service, ridership would be expected to be low among any group, whether able-bodied or disabled.

6.2.2 Lift Ridership by Route

Driver manifests identified lift-users on 30 of the 69 routes with advertised lift service, and also on 8 additional routes (see Table 6-2). However, during any given sample week only between 5 and 17 different routes were used by lift passengers. Seven routes together accounted for 70% of the ridership over the period during which ridership was recorded. These seven most traveled routes were:

TABLE 6-2. RIDERSHIP BY ROUTE
(Total of 9 Weeks Over 9 Months)

Route	Ridership	Route	Ridership	Route	Ridership
District		Virginia		Maryland	
D4	2	10S	8	A12	24
D8	3	10T	3	C2	45
H4	1	11D	26	F4	2
L4	3	16B	1	F6	28
M8	2	19Y	22	R2	4
N2	2	8W	3	T4	11
N4 (MD)	3	1D*	1	T6	7
32	3	23A*	4	T17	14
34	3	27P*	1	Y8	1
36	1				
38A (VA)	1				
38B (VA)	1				
42	2				
50	2				
70	3				
M2	47				
S2	1				
52*	2				
81*	1				
R6* (MD)	1				

*Not identified as an accessible route

M2 Union Station - Buzzard Point (DC) Rush hours only
C2 Beltway Plaza - Montgomery Mall (MD)
F6 Silver Spring - Greenbelt (MD) Rush hours only
11D Springfield - National Airport (VA)
19Y Pentagon - Hoffman Building (VA) Rush hours only
A12 Capital Plaza - Addison Road (MD)
T17 Belair Center - New Carrollton (MD) Rush hours only

On several of these routes, ridership routinely amounted to between 5 and 12 trips per week, suggesting the possibility of regular usage by individuals making work trips (either one-way or round trip). The survey indicated that sixty percent made work or school trips during the previous week.

Given the small numbers of trips taken on each route and the possibility that an individual travelled on more than one route, it appears that the number of users during any given week was relatively limited, i.e., approximately 10. This is consistent with the fact that although 52 individuals who had used the lift (one or more times) were identified and interviewed by the survey process, only six of these individuals were found to be using the lift during the sample week (in late May 1981). However, since many of those interviewed reported that they had stopped using the lift, it is possible that during sample weeks earlier in the project period a larger number of individuals made use of the lift.

6.2.3 Issuance of Reduced-Fare Identification Cards

The issuance of reduced fare identification cards to disabled passengers provides another measure of the demonstration's success in reaching the target market. This market includes both wheelchair-users and semi-ambulatory disabled.

Wheelchair disabled persons, who for the most part were totally unable to travel by regular Metrobus, began to constitute a small portion of the total number of disabled people registering for these permanent identification cards available since October 1975. Records are available beginning in June 1979, one month before the service started; in the succeeding 28-month period, 204 wheelchair users registered for these handicapped identification cards. The largest number in any given month (14) was recorded in October when all accessible routes were in service. Over the course of this period, the wheelchair disabled represented 1.4% of the total number of reduced farecards issued to disabled persons.

In addition to the wheelchair disabled, there are other reduced fare identification card holders who may use the lift. For example, during the 28-month period mentioned above, 368 cards were issued to those with leg injuries, and those who use walkers or crutches; 572 cards were issued to arthritics; another 434 cards were issued to amputees and persons with spinal and bone injuries. Finally, 267 cards were issued to individuals with cerebral palsy. The above card issuances represent another 12% of the total issued to all disabled people (see Table 6-3).

6.2.4 Rail Ridership by Wheelchair Users

Since rail systems present somewhat different barriers to disabled people and since Section 504 was to require costly modifications in many metropolitan areas with old rail systems,

TABLE 6-3. WMATA REDUCED FARE IDENTIFICATION CARD ISSUES BY DISABILITY

		Cumulative As of 9/20/81	%
I.	Physical Disabilities		
	A. Non-Ambulatory (Wheelchair)	204	1.4
	B. Semi-Ambulatory		
	1. Leg, Walker, crutches	368	2.6
	2. Arthritis	572	4.1
	3. Amputation, spinal, bone injuries	434	3.1
	4. Cerebrovascular	239	1.7
	5. Respiratory	162	1.2
	6. Cardiac	501	3.6
	7. Sight disabilities	783	5.6
	8. Hearing disabilities	3,598	2.6
	9. Dialysis	76	0.5
	10. Incoordination	291	2.1
		7,024	49.9
II.	Development Disabilities		
	1. Mental retardation	4,161	29.5
	2. Cerebral Palsy	267	1.9
	3. Epilepsy	205	1.5
	4. Autism	12	0.1
	5 Neuro	462	3.3
		5,107	36.3
III.	Emotionally Disturbed	974	6.9
IV.	Accompanied by Attendant	501	3.6
V.	Temporarily Handicapped	274	1.9
		14,084	

it is interesting to compare the rate of ridership on lift-buses with the use of elevators on the accessible Metrorail system (i.e., a proxy for ridership by those who cannot use escalators or stairs). WMATA has performed annual one-day surveys of elevator usage since 1978. Although they indicate that elevator use has grown each year, the number of Metro stations has increased during this period as well. Nonambulatory elevator users in the latest survey (April 1981) totaled 64 per day, making up less than 1% of all elevator users; in 1978 there were 42 per day, making up over 2% of elevator users. The change in the percentage is largely due to increasing use of the elevators by able-bodied riders.

The non-ambulatory elevator ridership represents approximately 16 round trips per day by Metrorail. Note that in comparison, lift use on Metrobus by the non-ambulatory appears to be averaging about 1 round trip per day during the same time period. Both are very tiny percentages of total riders. However, the proportional use of Metrorail by non-ambulatory appears to be much higher than use of Metrobus. A large number of factors which differentiate the bus and rail service may be responsible, including perhaps the fact that only 8% of weekday Metrobus service is scheduled to be accessible and that poor reliability has made it even less.

6.3 PROFILES OF LIFT-USERS AND NON-USERS

Profiles of lift-users and non-users are available from the surveys conducted as part of the evaluation. To the extent that the surveys captured a representative cross-section of the lift-user and non-user populations, these results are useful in answering questions about the potential market for fixed-route accessible service. Consequently, it was important to examine the representativeness of the sample before proceeding with an analysis of the socioeconomic and disability characteristics of the sample populations. Assessing the representativeness of the survey sample was a difficult task since almost no information was available concerning the total user and non-user populations. Instead, representativeness was assessed through comparison of the non-user sample, with a handicapped population group thought to resemble the target population. Although demographic characteristics of the "transportation handicapped" population are available from the National Survey of Transportation Handicapped People,* much of that population group does

*Grey Advertising, Summary Report of Data from National Survey of Transportation Handicapped People, prepared for UMTA/U.S. DOT, June 1978.

not use wheelchairs and would not require a lift to board a bus. In fact, many are elderly persons, 51% of whom reported they can get on a bus without difficulty.

More accurate as a proxy group given the nature of disabilities reported in the survey and the high incidence of use of mechanical aids are individuals who are paralyzed or have lower orthopedic impairments, since it is persons with these impairments who frequently require aids and who may find it difficult or impossible to board a regular bus. A recent publication of the Department of Health, Education and Welfare* provides statistics on these individuals gathered in a 1977 Health Interview Survey. As shown in Table 6-4, this group differs considerably from the more general "transportation handicapped" group in the National Survey. The proxy group is younger and contains a greater number of males and persons with higher (i.e., over $10,000) household incomes than the National Survey respondents.

Comparison between the non-user survey sample and the proxy group shows that non-users are very similar to the proxy population. There is a slightly higher incidence of non-users in the highest income group, but this difference could be the result of inflation during the period since the "proxy" population data was collected.

Because surveys were not extensive in some locations in the metropolitan area, there was some concern that lower income and minority disabled people were underrepresented in the survey sample. In general, however, we conclude that the sample was essentially representative and that conclusions can therefore be drawn regarding the differences between users and non-users of the lift.

6.3.1 Disability Characteristics

Lift-users included individuals with various disabilities; among the most prevalent were polio (25%), paraplegia (22%) and spinal cord injuries (14%). The lift-user population naturally tends to reflect the disabilities most likely to require use of mechanical aids (which make climbing steps difficult), i.e., wheelchairs, braces, etc. In fact, 81% of the lift-users sampled use a wheelchair.

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*Rehabilitation Group, Digest of Data on Persons With Disabilities, prepared for U.S. Department of Health, Education and Welfare, Office for Handicapped Individuals, May 1979.

TABLE 6-4. REPRESENTATIVENESS OF THE SURVEY SAMPLE

	Paralyzed/Lower Orthopedic "Proxy" Population	National Survey of Transportation Handicapped	Lift-User Sample	Non-User Sample
Sex				
Male	51%	37%	64%	43%
Female	49%	63%	36%	57%
Age				
Under 45	47%	N/A	66%	48%
45-64	28%	N/A	32%	30%
65 and Over	25%	47%	2%	22%
Income				
Under $10,000	48%*	71%*	36%	49%
$10,000 to $24,999	41%	25%	26%	25%
$25,000 and Over	11%	4%	39%	25%
Employment				
Working	31%	15%	60%	31%

*1977 figures.

The most frequent transportation-related functional impairments lift-users noted were climbing stairs and standing in a moving vehicle, each of which affected over 80% of respondents. Substantial numbers also indicated difficulty walking (e.g., to a bus stop), maneuvering through crowds and maintaining balance when the bus stops and starts, as would be expected of individuals who use mechanical aids. The average respondent had more than four of the functional difficulties listed in the survey. Despite the above difficulties, 41% of lift-users reported that they could use a regular Metrobus (without a lift).* This included 5 of 6 non-wheelchair individuals and 4 "part-time" wheelchair users. Thus for many lift-users the lift represents a convenience rather than a necessity.

*This question was asked in Round 2 only.

Among non-users in wheelchairs (44% of the total non-user sample) the most frequently cited disabilities were cerebral palsy, spinal cord injury and amputation. Among ambulatory non-users (who as a group are older), the major disabilities noted were arthritis and orthopedic impairments, which tend to be associated with increasing age. Not surprisingly, these non-users make the greatest use of walking canes.

Like the users, nearly all non-users surveyed experience difficulty performing the physical functions required to travel by bus. Problems climbing stairs (the difficulty lift equipment is designed to eliminate) were most frequently mentioned, but on the average respondents indicated difficulty performing five of the transportation-related functions specified in the survey. This means that for the majority of individuals, solely equipping buses with lifts might not be enough to make bus riding feasible (see Table 6-5).

6.3.2 Factors Differentiating Users and Non-Users

Several interesting contrasts can be made between the surveyed user and non-user groups which seem to indicate that lift-users are a more self-reliant and independent group (see Table 6-6). The majority of lift-users live alone or with friends, while most non-users live with family members (particularly non-users in Round 1 and those in Round 2 who use wheelchairs). Furthermore, over half of the wheelchair lift-users work full time versus about one quarter of the wheelchair non-users. Lift-users seemed able, or willing, to travel greater distances to get to a bus, and were more likely to view themselves as having a convenient lift-bus stop near their residence. This last finding is quite interesting, since both the users and the younger, higher income non-users have similar patterns of disabilities (e.g., greater prevalence of spinal

TABLE 6-5. RESPONDENTS WITH PROBLEMS CLIMBING STAIRS WHO HAVE OTHER FUNCTIONAL DIFFICULTIES

	Lift-Users	Non-Users
Walking to the bus stop	67%	77%
Waiting outside for the bus	38%	53%
Maneuvering in crowds	58%	65%
Maintaining balance during stops and starts	56%	69%
Standing in a moving vehicle	82%	77%

TABLE 6-6. COMPARISON OF LIFT-USERS AND NON-USERS

	Lift-Users			Non-Users		
	Wheel-chair	Non-Wheel-chair	Total*	Wheel-chair	Non-Wheel-chair**	Total*
Sex						
Male	65%	67%	64%	46%	40%	43%
Female	35%	33%	36%	54%	60%	57%
Age						
65 and Over	0%	17%	2%	5%	41%	22%
Income						
Under $10,000	33%	33%	36%	36%	61%	49%
Employment Status						
Working	60%	75%	60%	36%	26%	31%
Residence						
Washington, D.C.	48%	29%	36%	28%	28%	28%
Virginia	24%	10%	18%	36%	32%	34%
Maryland	45%	70%	41%	33%	39%	36%
Lifestyle						
Live Alone	51%	10%	41%	22%	48%	34%
Live w/Family	41%	80%	49%	73%	44%	59%
Live w/Others	8%	10%	10%	6%	8%	7%
Have Household Automobile	71%	80%	71%	84%	62%	73%

*Includes individuals who did not answer the question about use of a wheelchair

**Who would use the lift if using Metrobus

cord injury, paraplegia, etc.). However, the difference may be attributable to the severity of the condition; the non-users show a greater incidence of functional handicaps. This could also explain why, despite other similarities, so many more non-users than users live with family members.

Another striking contrast between users and non-users is residential location (particularly in Round 2); only 18% of the lift-users live in Virginia, compared to 44% of wheelchair and 37% of non-wheelchair non-users who would need to use the lift. It appears that environmental as opposed to socioeconomic factors are more likely to be responsible for this difference. While both Virginia and Maryland suburbs include wealthier individuals and a less dense transit network, Virginia lift-bus routes operate on more major roads with fewer traffic signals, curb cuts and sidewalks, all of which combine to make accessing the bus quite difficult for disabled persons. While Virginia service is concentrated on fewer routes, it offers more frequent service; the inaccessible environment, however, probably outweighs the benefit of higher frequency service.

A close look at the non-users reveals that the sample includes two very different groups. One consists of all non-users in wheelchairs and some ambulatory non-users, who, like lift-users are predominantly younger, male, employed full-time and earn annual incomes in excess of $10,000. The second group of ambulatory non-users, differs noticeably from the first group in that they are predominantly older, less affluent, female and more likely to live alone. Perhaps the most important question to be addressed is why the individuals in this second group, who make up a considerable portion of the target population, generally are not making use of the accessible bus service. Perhaps their needs are being met in other ways, e.g., through social service agency transportation or by family members and friends. If not, however, it could mean that there are important transportation needs which the lift-bus could not meet.

6.4 TRAVEL BEHAVIOR AND MOBILITY

6.4.1 Mode Availability

Compared to the general population, the elderly and handicapped population typically has fewer options for travel. The addition of lifts to Metrobuses has had a substantial impact on the availability of accessible transportation for portions of the disabled population. This is evidenced by the fact that:

(1) many users and non-users who could not previously make use of Metrobus indicated that they were (or would be) physically able to travel by lift-equipped Metrobuses; and (2) given that a lift-bus stop was nearby, Metrobus would be a convenient means of travel for several types of trips. For other segments of the disabled population, however, long distances to the bus stop made the service unavailable.

Both the lift-users and the non-users surveyed appear to be relatively mobile, primarily using automobile transportation. Seventy-one percent of the surveyed lift-users are physically able to drive an automobile/van, and over half (55%) frequently have this travel option available to them (see Figure 6-3). These characteristics reflect the travel behavior of the general population rather than that of the disabled population: sixty-seven percent of all persons throughout the country drive themselves when they need transportation, versus only 32 percent of transportation handicapped people nationwide.*

Non-users are more able to obtain rides from household members -- obviously this is due in part to differences in household composition (see Figure 6-4). Non-users also indicated greater availability of agency transportation, although even in their case only about 25% frequently have this option available. Finally, lift-users indicated a greater availability of Metrorail. It is interesting to note that lift-users were not more likely to have a convenient Metrorail stop nearby; perhaps lift-users are willing to travel longer distances to get to the Metrorail stop (they are generally willing to travel farther than non-users to a bus stop).

There are no major differences in mode availability between the wheelchair and non-wheelchair groups of surveyed lift-users or non-users.

6.4.2 Mode Use

For all trip purposes combined, approximately 45% of the lift-users usually drive an automobile. Mode choice varied slightly among different trip types. One difference is that for some trip purposes many lift-users usually obtain rides with other household members or with friends, while for other types of trips this is not an option. Social-recreational trips are most likely to involve trips with friends or household members, while work/school trips are least likely, as might be expected.

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*National Survey, op.cit.

Figure 6-3

MODE AVAILABILITY FOR LIFT-USERS (Other Than Metrobus)

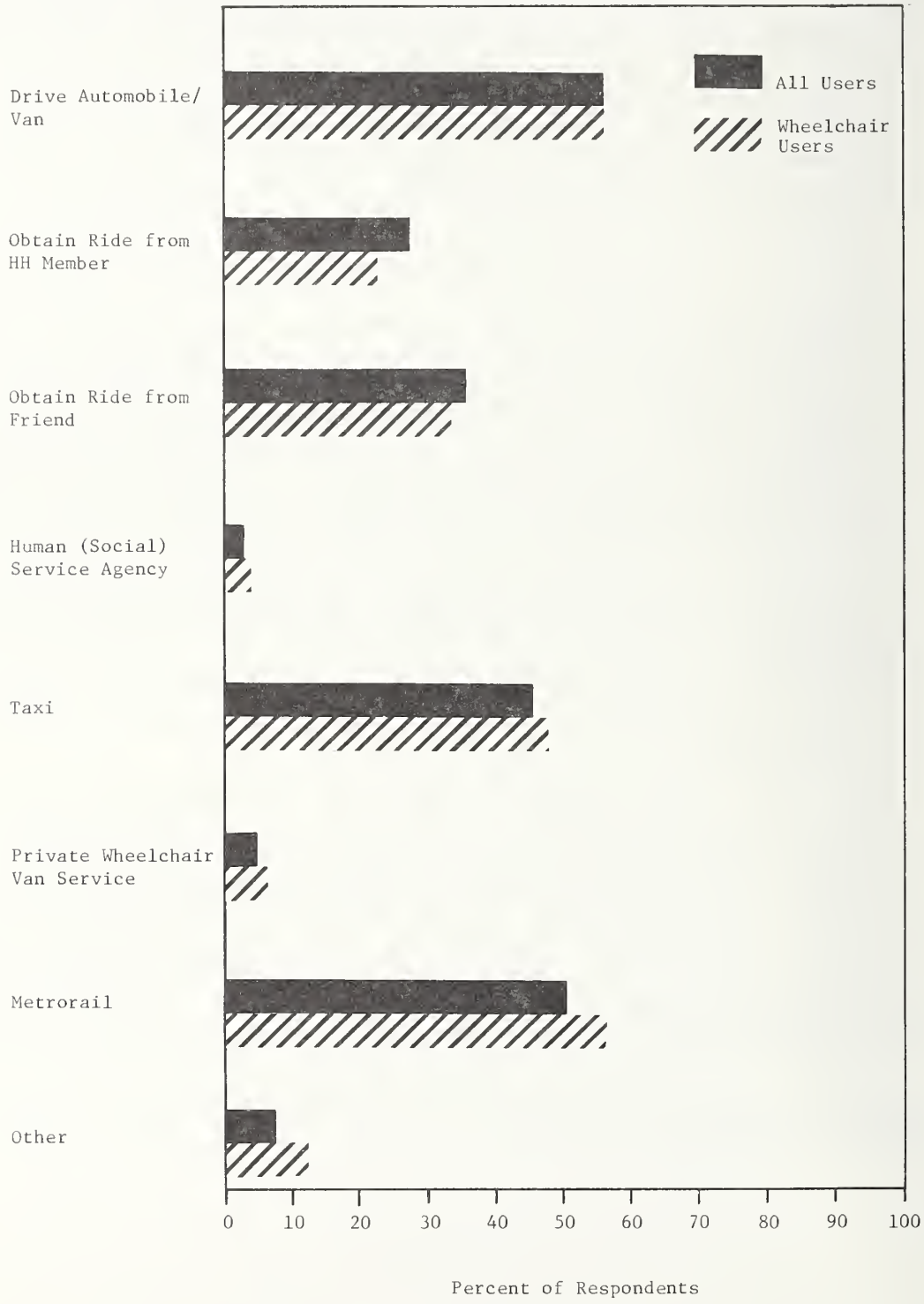
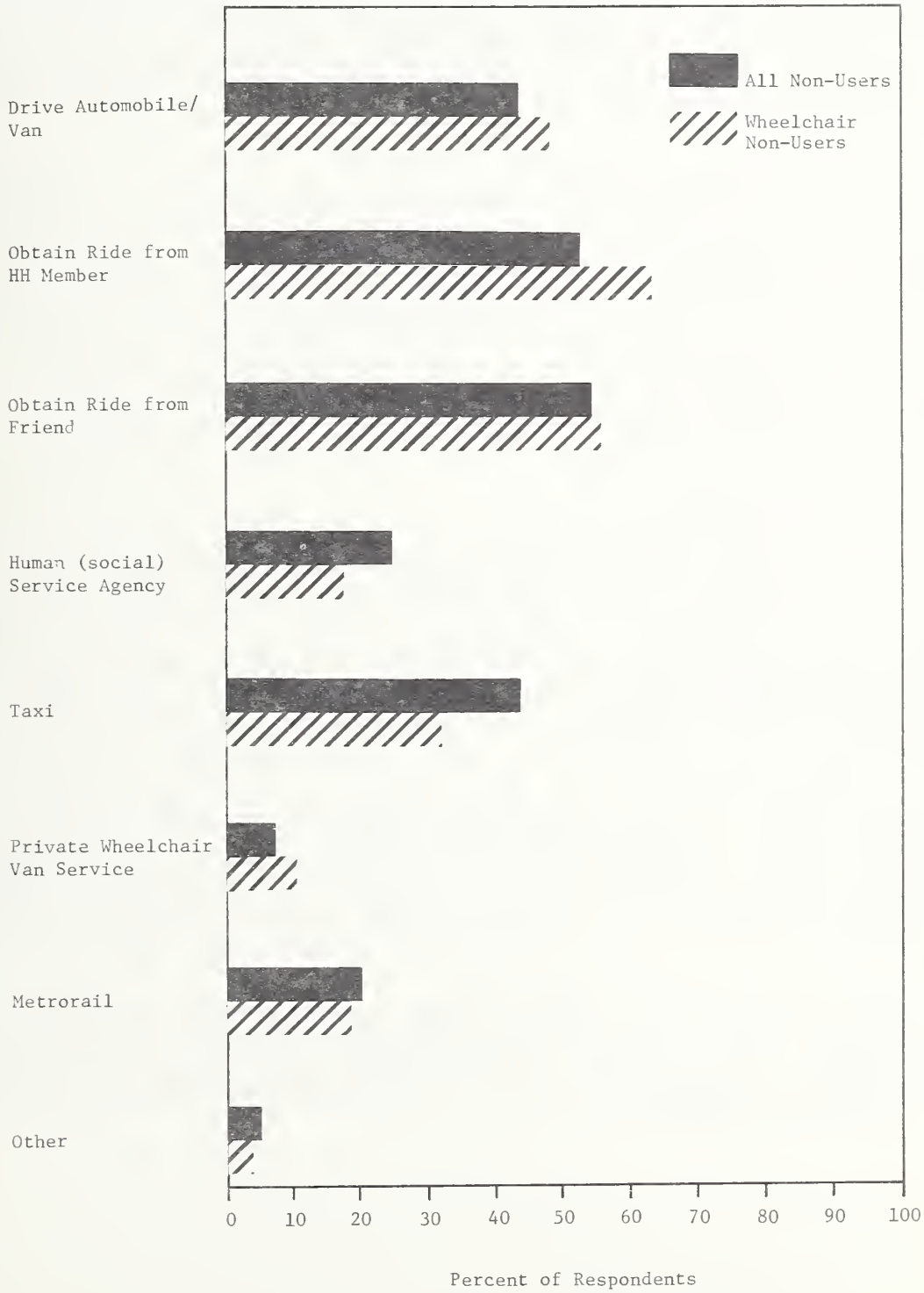


Figure 6-4

MODE AVAILABILITY FOR NON-USERS



For users, Metrobus is a more likely mode for work/school trips and personal business trips. These trips are often to business centers during daytime hours when bus service is good and when friends or household members are often least available. Use of Metrorail exhibits similar characteristics. It should be noted that only three persons in the sample use private wheelchair-van service and only one person indicated using social service agency transportation (for medical trip purposes). This indicates that the lift-user sample may have included very few people associated with such agencies, and therefore that the sample was quite different from the overall transportation handicapped population in the D.C. area. It may also mean that those who have agency services available prefer to use them exclusively rather than use Metrobuses for some trips.

Travelling by automobile (either as driver or passenger) is also the dominant mode of travel among non-users. Since 10% of wheelchair non-users do not always require a wheelchair, some are able to travel by regular Metrobus and several said they would not require a lift in order to board a bus. Among the non-wheelchair group, 63% reported that they are able to use regular, non-lift Metrobus service (albeit with some difficulty). When travelling on a lift-equipped bus, however, a substantial number of non-wheelchair individuals (72%) indicated that they would request operation of the lift.

6.4.3 Trip Rates

Results from 20 Round 2 respondents showed that lift-users made an average of 13.7 trips by all travel modes during the week before the survey. Specific trip rates were not reported in Round 1. This is considerably higher than the National Survey of Transportation Handicapped's figures (for mass transit areas) of 7.4 trips per week for all transportation handicapped, 5.5 for wheelchair users and 6.2 for those who use other aids. It should be noted that on the average, lift-users made fewer than 5 trips per week by lift-bus. Combined with the fact that 56% of users reported no increase in total trip-making, this suggests that current lift-users as a group are now and were previously more mobile than other persons with similar disabilities. This raises the question of whether less mobile individuals are not being adequately served by the lift-bus.

The non-users in Round 2 are also relatively mobile -- only 10% make no trips at all and more than half make at least 5 trips per week. The average is 8.5 trips per person per week (34 trips per month).

Disaggregation into wheelchair and non-wheelchair segments of the Round 2 non-user group shows that non-wheelchair persons make 28.4 trips per month (approximately the national rate) while persons in wheelchairs make many more monthly trips (41.6). In fact, their trip rate approaches that of able-bodied individuals who typically make over 50 trips per month. Environmental and socioeconomic factors such as age or employment status rather than differences in physical ability seem to account for this. A greater percentage of those persons in wheelchairs work or are in school and they tend to be younger, and presumably more active. Individuals in the wheelchair group also indicated higher household incomes, and tend to live with other family members rather than alone. Because of this, they frequently are able to travel by automobile, either as drivers or passengers.

6.4.4 Impact on Mobility of Disabled Lift-Users

The lift-bus service appears to have improved mobility significantly for some of its users. The extent of the impact on travel mobility is indicated in several ways:

1. Lift-equipped Metrobus became a primary mode of travel for many of those who tried the service (especially for work and personal business trips, for which about half indicated Metrobus as a "usual" mode).

2. Almost half (44%) of those who answered a survey question concerning their ability to use other means to make the trips they made on the lift-bus said that all such trips would have been foregone.

3. Nearly half (44%) of surveyed lift-users indicated that they had increased the number of trips they make each month, and nearly three quarters (72%) indicated that the lift-bus allowed them to travel to new places and new activities.

In contrast to the above, responses to questions about their most frequent trip on the lift-bus revealed that just one user made new (induced) trips. All others indicated their most frequent lift trips were diverted from other modes, primarily from the automobile; very few were diverted from either taxi or private wheelchair van carrier. If lift-bus service were truly serving the transportation disadvantaged, one would have expected to see either greater diversions from taxi and private wheelchair van carriers or more induced travel, since one would assume that previously individuals using these modes either had no alternatives available or had to use more expensive modes.

Despite the fact that most users did not report that their most frequent lift trip was induced, several lift-users report that they would not have taken some of the lift trips they made in the past week if the lift-bus were not available. In fact, in these cases, all of the individual's lift trips would have had to be foregone, including work and school trips. Thus, one may conclude that for a small segment of the user population, the lift-bus did provide a major mobility benefit. However, given the small total number of users, one must conclude that the mobility of disabled persons as a group is largely unaffected. A follow-up survey of thirty users found only 6 (20%) still using the lift-bus, most having found alternative means of travel since participating in the original survey. Recent data also indicate that few, if any, new riders have been added.

6.5 LIFT TRIP CHARACTERISTICS

6.5.1 Trip Purpose

The survey data show that of the 25 lift-users who used the lift "last month", 15 did so for work or school trips, 12 for shopping trips, 5 for medical trips, and 11 for "other" trips. Because of the higher frequency of work and school trips, the distribution of trips is even more heavily weighted toward these trip purposes than the distribution of users.

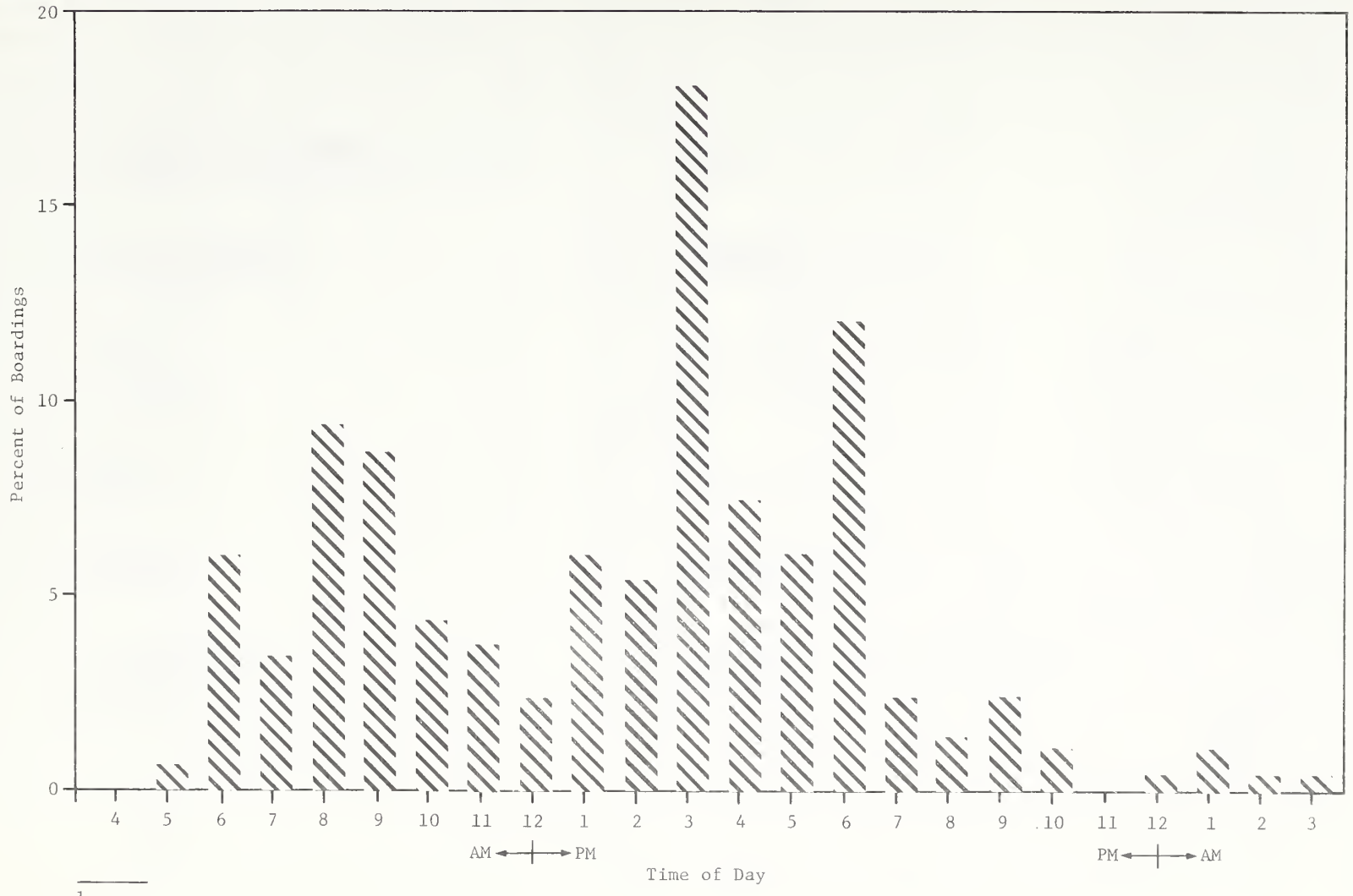
6.5.2 Time of Day Distribution of Lift Trips

Driver manifest records from eight sample weeks provide data on the departure times of lift-user trips. The pattern that emerges is one of ridership throughout the day but with pronounced peaks in the mid-afternoon, and in the late morning and early evening peak hours (see Figure 6-5). In general, this reflects the fact that work and school trips make up substantial portions of lift-trips and it probably mirrors the travel patterns of the average Metrobus passenger. The exact location of the peaks, however, seems to indicate that some riders may schedule their trips to avoid the height of the typical peak periods. Note that the afternoon trips by lift-users peak between 3:00 and 4:00 p.m. and between 6:00 and 7:00 p.m. rather than 5:00 to 6:00 p.m., and that morning trips peak between 8:00 and 10:00 a.m.

It should be recognized that despite the fact that this information is derived from data from eight sample weeks spread over nine months, it represents the travel patterns of a small

Figure 6-5

RIDERSHIP BY TIME PERIOD[1]



[1] Based on driver manifests from 10 sample weeks

user group and, therefore, may be very much specific to the peculiarities of these individuals' travel behavior.

6.5.3 Travel Time and Cost

Eight users (38% of survey respondents) stated that they often transfer between Metrobuses and fourteen (73%) said they transfer from Metrobus to Metrorail. Travel on the lift-bus (for the most frequent trip) took 25% longer on average, while fare was increased by about 20% over previous modes.* (These calculations are rough due to the use of categorized responses.) It is surprising that the lift-bus has diverted travellers who have automobile alternatives without providing shorter travel times or lower costs.

6.5.4 Bus Stop Access

Overwhelmingly, lift-bus users get to the bus stop and travel on the bus on their own. While most users live within 2 blocks of a bus stop, most said they would travel somewhat further (up to 4 blocks) to reach a bus stop in good weather. Under rainy or snowy conditions, however, as much as one half of the users responded that they would travel only one block or less, although there is still a group of 20% who indicated that they would travel more than 4 blocks even in bad weather (see Figure 6-6).

It should be noted that half of the wheelchair lift-users live in areas where there are no curb cuts. While the lack of curb cuts was noted as a major problem by users, it did not prevent these individuals from using the bus. Perhaps, in some areas, driveways might serve as a substitute for curb cuts.

In contrast, a substantial number of non-users indicated that they would have problems getting to the bus stop. For wheelchair persons this is frequently due to a lack of curb cuts between their residence and the bus stop. The need for assistance when travelling and limitations on distances individuals are willing to travel also create difficulties in reaching transit stops. Close to half the non-users surveyed would not be willing to travel more than one block to reach a bus stop, even in good weather. In poor weather (i.e., rain or snow) more than half would not travel any distance to a bus

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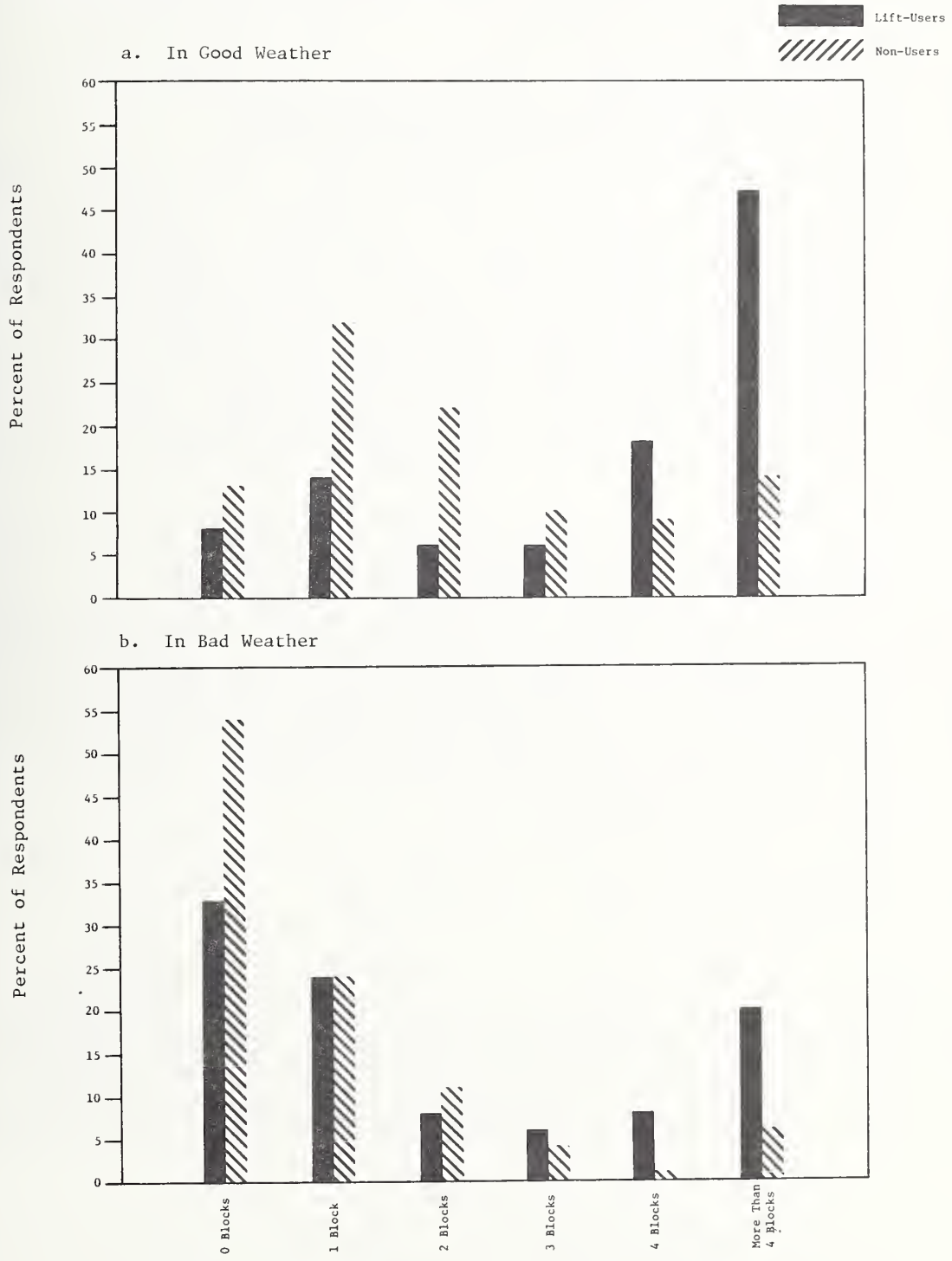
*It should be noted that the survey question referred to fare rather than cost, thus excluding the cost of personal automobile transportation. For those who previously paid a fare, average fare was reduced 16%.

Figure 6-6

DISTANCE WILLING TO TRAVEL TO A BUS STOP



stop. In addition, there were a substantial number of respondents (primarily individuals in wheelchairs) who said they would be physically unable to get to a bus stop under any conditions. The above indicates that availability of lift-bus transit service in their neighborhood by itself would not meet the travel needs of many of these individuals, since they would not perceive the service as available.

6.6 MODE CHOICE ISSUES

6.6.1 User Preference for Fixed-Route Service

Despite problems with the fixed-route lift service, users indicated by a 2 to 1 margin that they preferred the service to the alternative of a door-to-door service. Considering that many of the difficulties users experience with the service involve access to the bus, the degree of support for the concept of fixed-route lift service is somewhat surprising. One possible explanation is that users are advocates of this concept for reasons other than level of service -- for example because of its contribution to mainstreaming the disabled. Another possible explanation might be that they fear that a door-to-door service would be limited in scope and prone to budget cutbacks.

6.6.2 Reasons Why Non-Users Don't Use the Lift-Bus

The single most frequently cited reason given by potential users for not using lift-bus service was the availability of a personal automobile and preference for its use (an issue related to convenience). Nearly 40% of all non-user respondents have a car they can drive, and driving is the usual mode for most when making most types of trips. Many of these individuals also cited several inconveniences of the lift service such as: inconvenient schedules, poor bus stop location, lack of service to the desired destination, and long wait times for transferring. These are criticisms which could be expected from any group of potential transit users.

About one quarter of the non-users who would require a lift to board a bus were unaware of the service. This was the single most frequent cited reason for not using lift-bus service among Round 2 non-wheelchair non-users, who were more likely to be female and elderly and to have lower incomes, no household automobile and no driver's license. Presumably some additional marketing could reach these people and encourage

some of them to try accessible bus service, although lack of convenience and some physical difficulties will probably prevent a number of them from becoming regular users.

Nearly all non-users surveyed experience difficulty performing the physical functions required to travel by bus. While climbing stairs (the difficulty lift equipment is designed to eliminate) was the most frequently mentioned problem, the majority of respondents also had trouble standing in a moving vehicle, maintaining balance during stops and starts, and maneuvering through crowds. A significant number of all non-users specifically indicated they felt they would have problems boarding or maneuvering on lift-bus vehicles. Nevertheless, most feel they are physically able to use lift-buses. The only significant physical difficulty mentioned by non-wheelchair persons as a reason for not using the bus was difficulty in transferring between buses.

WMATA demonstrations or training sessions could help the relatively small proportion of non-users who do not feel they are able to use the lift-buses. For some individuals, this feeling could reflect misconceptions about what is required to use the lift, and their attitude could change with the opportunity to gain some experience and guidance using the equipment. Unfortunately, however, the WMATA sessions have reached only about 20% of those non-users surveyed.

The importance of convenience factors, the availability of automobile travel options, and perceptions that service is unreliable indicate that the potential for additional lift-bus use among non-users is limited. While convenience issues could be resolved for some by service changes (e.g., schedule changes, changes in stop locations), for others difficulties getting to a bus stop and other physical problems relating to travel would remain. More significantly, for many individuals, lack of lift-bus use appears to result from an alternative mode choice decision rather than problems with lift service.

6.7 MARKETING EFFECTIVENESS

6.7.1 Awareness of the Service

As previously noted, about one-quarter of the non-users who would require a lift to board a bus were unaware of the service. While this number seems fairly large, it should be noted that in the later second round of surveys, only 7% of those in

wheelchairs (the key target market) were unaware of the service. Although this may indicate that marketing reached the target group over the course of the project, one may still question whether a significant group of potential riders was neglected -- the non-wheelchair disabled. About 40% of these individuals in the second round were unaware of the service.

About one-third of non-users are not sure if a nearby bus stop is a lift-bus stop. This lack of detailed lift-bus route information might reflect lack of interest in the service on the part of many non-users. While most wheelchair persons interviewed as well as non-wheelchair persons surveyed in Round 1 were aware of lift-bus service, these people did not use accessible bus service in many cases because they had and preferred other alternatives. Thus they had little need to be concerned with details of service characteristics. On the other hand, most of the Round 2 non-wheelchair respondents who were aware of the service, and who were also more dependent upon non-automobile travel modes, knew if a lift-bus stop was nearby. Unfortunately, in many cases, there was none.

Perhaps one other indication of the effectiveness of WMATA's marketing effort is the fact that half of the lift-user respondents to a question on problems with the lift-bus noted "difficulty getting schedules" to be either a "medium" or "serious" problem. Even if awareness about the service among the disabled is high, easy access to user information about the service is essential, particularly in the case of a partially accessible service where headways between accessible buses even on accessible routes may be rather long.

6.7.2 Influences of Promotional Activities

Various influences encouraged users to try the service, including demonstrations of the lift-bus, which reached 39% of users and 22% of non-users surveyed (see Figures 6-7 and 6-8). Television and newspapers have been most effective in informing the non-users about the service; these were also important media for users, surpassed only by word of mouth. Human service agencies and health/rehabilitation workers were not significant information conduits for lift-users. This fact may be correlated with the significant number of working age and employed persons in the sample who may lack affiliation with agencies and/or interaction with health and rehabilitation personnel. Since the second round involved contacts with agencies, the lack of an agency/health-rehabilitation worker role may indicate that either their clients choose not to use the lift-bus service or that agencies have simply not made an effort to promote the service to their clients.

Figure 6-7

HOW LIFT-USERS LEARNED ABOUT THE LIFT BUS

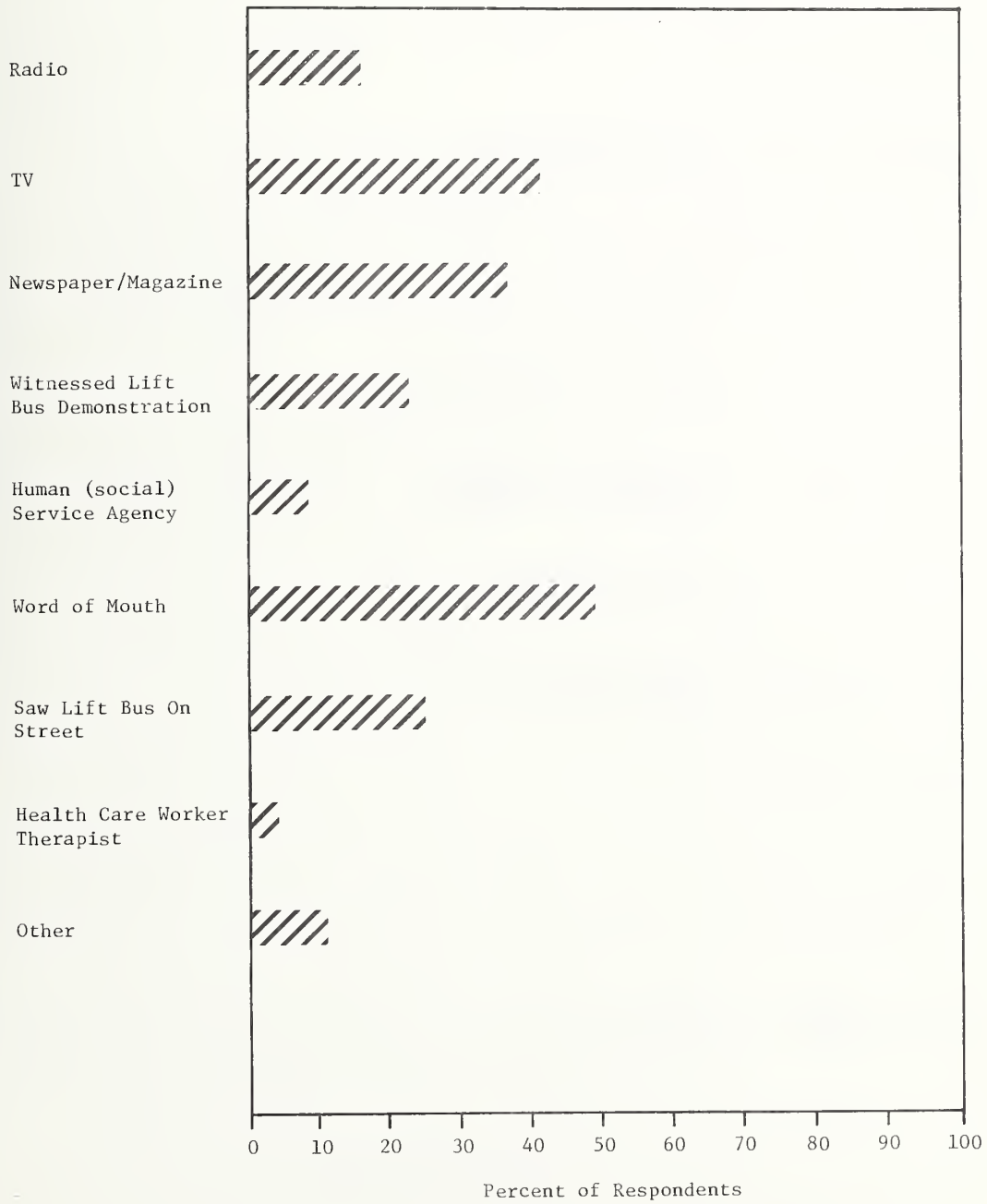


Figure 6-8

WHAT MOST INFLUENCED LIFT USERS TO USE THE LIFT BUS

To some degree, more information about the lift-bus service could affect individuals' opinions about their ability to use it. For example, non-users in wheelchairs may not be aware of the arrangements to secure the wheelchair once on the bus. Acquainting these potential users with the service's characteristics was the rationale behind WMATA's neighborhood bus demonstrations and GWU's training of rehabilitation personnel. Unfortunately, while these efforts were useful in some cases, they appear to have reached a relatively small number of potential users. While it is possible that persons who did not participate in WMATA demonstrations or other training programs were not interested in doing so, it is also possible that demonstration and training strategies could be more effectively targeted at the potential user population.

6.8 SUMMARY

The overall conclusion of the travel behavior analysis is that the lift-bus has improved mobility to some degree for a very small segment of the disabled population. The users of the lift are atypical of the overall disabled population, being younger, employed persons, predominantly male, who choose to use the lift-bus for a variety of trip purposes, including many work and school trips. Very few, however, use the service regularly.

On average, lift-users are more mobile than non-users but evidence suggests this mobility existed before the lift-bus was available. Although most lift-users reported that the lift service enables them to travel to new places, few users said they would not have been able to make their recent lift-bus trips by other means.

The lift service has clearly not demonstrated its ability to serve the traditional markets that doorstep services have transported -- the elderly and lower income disabled people. Although a considerable number of non-users, particularly those not in wheelchairs, were unaware of the service, several factors other than awareness seem to distinguish users from non-users and explain why the latter don't use the service. The key question to be answered is whether non-users do not use the bus: (1) because of poor system coverage, (2) because of poor service reliability, (3) because they are physically unable to, or (4) because they choose not to because it is inconvenient.

It is evident that all these factors play a role. For example, non-users were found to be unwilling to travel as far to reach a bus stop as users were, indicating that system coverage

is certainly not the sole issue. However, since non-users were often older and had a greater incidence of arthritis and orthopedic impairments, this unwillingness could be related to disability characteristics. It is possible that elderly people may be more sensitive to declining physical abilities, and may in fact underestimate their true physical capabilities.

The most significant result of the surveys is that convenience of service is a much more important issue to most disabled people than their physical abilities or fears relating to using the lift-bus. The Washington D.C. Metrobus is only "partially accessible" with only a percentage of scheduled runs providing lift service. Moreover, while long headways made reliability a critical issue, WMATA failed to meet even the advertised service levels. Given infrequent and unreliable service levels, substantial ridership cannot be expected among the disabled, just as it could not among the able-bodied under similar circumstances.

7. OPERATOR PRODUCTIVITY AND ECONOMIC IMPACTS

Key operator concerns relating to the use of lifts on fixed-route buses are whether increased fleet requirements and/or increased operating costs result. In particular, operators have been concerned about the effects of: increased dwell times on the schedules; increased driver duties on driver wage rates; lift malfunction on spare vehicle requirements; and lift maintenance on operating cost.

This section examines each of the major potential productivity and economic impacts on the operator associated with the demonstration. The first three sections concentrate on lift utilization, fleet productivity, and labor issues. The final section investigates the cost implications of the demonstration services, including start-up costs and ongoing expenses related to both operations and support services.

Unfortunately, significant data collection problems have limited the amount of information available in many of these areas. In particular, questionable or missing cost data has limited our ability to draw conclusions concerning the financial impacts of demonstration activities. Specific problems that occurred are noted in the relevant sections of the discussion.

7.1 LIFT UTILIZATION

As discussed in Section 6, lift use during the demonstration was relatively low, averaging about 40 trips per week or about 8 trips per weekday during favorable seasons. This means lift-users accounted for only about 0.02% of passengers carried on the entire Metrobus system. With about 1300 scheduled accessible bus trips per weekday, this averages a negligible 12 lift operations per 1000 bus trips.

7.2 FLEET PRODUCTIVITY

The productivity of WMATA's fleet could have been affected in several ways:

1. Lift malfunctions could have increased out-of-service time and therefore required additional spare vehicles;

2. Lift boardings could have increased dwell times substantially thereby requiring that additional time be added into the schedules and/or into layover times;

3. Ridership could have increased substantially and affected load factors. (This was clearly not an issue since lift usage was very low and without lift riderss seating capacity was only marginally impacted.)

Earlier experience in Milwaukee and other locations demonstrated the necessity of reserving a considerable number of accessible vehicles for use as spares in the event of equipment breakdowns, equipment reliability had been shown to be poor. As a result, WMATA purchased enough lift equipped buses to maintain an average spare ratio of 37% (56 of the 151 buses) whereas it maintains only a 10% spare ratio for the non-accessible buses in its fleet. Had a 10% spare ratio been possible to the accessible fleet, only 15 of these vehicles would have been required as spares, enabling WMATA to increase scheduled lift service by almost 50%. In fact, in many instances spare lift vehicles could be used as replacements for vehicles in regular service, essentially increasing slightly the overall spare ratio for the regular fleet.

Frequent breakdowns further increased non-productive time for accessible buses. The morning lift status reports show about 20% of accessible buses out of service on the average. In October 1980, when service reliability was at its worst, more than 30% of scheduled accessible runs were not provided with operating lifts. Although the overall lift-bus spare ratio was 37%, the spare ratios at individual garages ranged from 11% to 53%, creating problems at those garages with fewer spare vehicles and a higher breakdown rate.

No additional run or layover time was built into accessible route schedules, since the level of lift usage was expected to be low, at least during the initial stages of the demonstration. It was understood that adjustments would be made in the future if required. However, despite the fact that many able-bodied passengers perceived lift boardings to take substantial time, the overall impact was not significant enough to disrupt regular schedules and no adjustments were required.

7.3 LABOR ISSUES

The potential labor impacts of the demonstration were focussed on the drivers. At issue were the drivers' attitudes towards the special equipment and the additional tasks the service would require, the union's position on extra pay for additional duties, the demonstration's impact on total driver hours and the effectiveness of the driver training program.

At the outset of the demonstration, there was concern that because lift bus drivers were required to go through a special training program, operate new equipment, assist passengers using the lift and participate in data collection activities, drivers might protest the additional workload as the demonstration progressed. In order to avoid such difficulties, drivers, maintenance personnel and union representatives were consulted and included in the service planning process. To examine driver reactions to the lift service, driver surveys were planned as part of the evaluation effort and conducted during May and June 1981. The survey sample included drivers from all eight garages, and consisted of 112 drivers who were currently driving accessible runs (of 350 drivers who operated accessible runs according to the schedule at that time) and 134 who were not. In addition to collecting data on driver opinions towards the accessible service, the surveys obtained first-hand information on driver operating experiences.

In general, drivers appear to have been relatively unaffected by the accessible service, perhaps because its level of utilization has been so low. Drivers who had operated the lift in passenger service averaged 10 lift operations over a two-year period. Thirteen percent of drivers had never operated the lift in service.

While about 1 in 6 drivers had not experienced problems with the lift, the majority had some difficulties with the equipment. As a result, about one-third of drivers rated the lift as unreliable. Although drivers generally did not attribute the problems to confusing controls, refresher training in lift operations was desired by a number of drivers. Both the awareness and operations training programs were rated highly valuable by the drivers.

About half of the drivers reported that they had never left their seat to assist passengers. Based upon lift-users' responses to their survey this did not appear to be a problem. If the lift were attracting a less independent group of disabled travelers, perhaps there might be a greater need for driver assistance. When help has been given by drivers, it has only occasionally been on the driver's initiative.

The driver survey results indicated that most drivers are relatively indifferent to whether their run is accessible or not and that the majority support the lift bus project. However, 22% specifically said they "preferred not to be involved in the lift bus project" for reasons which are not clear. Only 11% of lift drivers chose accessible runs in order to "help the disabled"; for most drivers, factors not related to the lift (e.g., better route characteristics or better time of day) were behind their choice. With regard to their next pick, accessibility was again not a consideration for most drivers; 67% said it "does not matter" if a route is accessible or not and only 3% indicated that they would specifically choose an accessible run. General monitoring of labor relations, which also indicated the lack of any significant driver reactions, supported these survey results. One can only speculate whether driver reactions would have been as minor if the service had attracted a larger ridership, particularly if the riders included individuals who need more driver assistance.

7.4 COSTS

The costs associated with the demonstration project include equipment and operations, as well as start-up and ongoing expenses related to administrative and support services and data collection. Much of the data collection and related administrative costs are due to the demonstration nature of the project and are not likely to be service costs in non-demonstration contests. To the extent possible, distinctions are made between data collection and service-related costs in the ensuing discussion.

Demonstration funding covered some of the administrative and support service costs. All the costs of equipment, maintenance and repair services and additional lift-bus related labor were borne by WMATA (which receives federal capital and operating aid). The budgets for the UMTA demonstration grants to WMATA and George Washington University are shown in Tables 7-1 and 7-2. While some of the line items covered operating costs (training programs and coordination), others relate to training program development costs, data collection and evaluation.

7.4.1 Start-Up Costs

7.4.1.1 Capital (Equipment Purchase) Costs - The accessible buses came lift-equipped from the factory. Thus the cost of the installed lift, flip seats and other special equipment was

TABLE 7-1. UMTA GRANT BUDGET: WMATA

1.	Mobile Classroom	$12,000
2.	Sensitivity Training	
	GWU 3-day Seminar	$ 5,600
	Course Preparation	$ 700
	Course Materials	$ 10,000
	Course Instruction (Trainer Salaries)	$ 6,700
	Driver Training Hours	$103,700
		$126,700
3.	User Training	$ 19,400
4.	Public Service Announcements (Preparation)	$ 7,000
5.	Data Collection	$ 10,000
6.	Project Coordination	
	WMATA Staff	$ 12,000
	Technical Coordinator	$ 49,300
	Preparation of Training Manual	$ 3,000
	Miscellaneous/Supplies	$ 500
		$ 64,800
	TOTAL	$239,900

TABLE 7-2. UMTA GRANT BUDGET: GWU

1.	Driver Training	$121,429
2.	Allied Health Training	$ 75,893
3.	Equipment Evaluation	$ 45,536
4.	Surveys of Disabled Individuals	$ 30,357
5.	Administration/Review	$ 30,357
6.	Overhead and Indirect Costs	$106,427
	TOTAL	$410,000

essentially the difference between the cost of an accessible and a regular bus of the same manufacture, or $6,600 (in 1978 dollars). This totals $996,600 for all 151 lift-equipped buses.

During acceptance testing, WMATA uncovered a variety of equipment problems, such as poor performance of the sensitive edges on the lift (see Section 4). Several of these modifications to the equipment were made by the manufacturers (Flxible and Vapor) at no cost to WMATA. The cost of other modifications made by WMATA at its own expense is included in the repair and maintenance costs.

7.4.1.2 Maintenance and Equipment Acceptance - During the start-up phase of the project, WMATA employed one full-time lift mechanic and a lift-bus supervisor for about 70% of his time. The cost of these personnel in 1979 dollars was about $30,900 for the six-month start-up period.

7.4.1.3 Mechanic Training - Each of the eight division lift mechanics received about one week of training at the Bladensburg shop facility during the start-up phase of the project. Thus, approximately 320 hours of training were involved at a cost to WMATA of $5,000 in mechanic time. In addition, Vapor held a two-day training session for WMATA maintenance supervisors and lift mechanics before the buses were delivered. About 20 staff members attended at an estimated cost of $6,000. Thus, the training of maintenance staff cost WMATA about $11,000.

7.4.1.4 Driver Training - The driver training program consisted of two parts: training in how to operate the lift mechanism, and a disability awareness program. All WMATA operators underwent training since conceiveably they all could drive an accessible bus at some point. Training of existing operators was staggered over the demonstration. Between April 1979 and the conclusion of the project in August 1981, 2,690 drivers took the 21-hour sensitivity awareness course at a total cost of $101,615 (assuming an average driver salary of $15.11 including benefits over the course of the demonstration). The operations training program took 1 hour per driver and thus cost $20,323 in driver time.

WMATA instructors participating in the awareness training sessions expended 456 hours being trained by GWU staff and 442 hours training bus drivers, for a total cost of $15,024 based on an average rate of $16.73 including benefits (see Table 7-3). The total cost of the driver training program excluding

TABLE 7-3. DRIVER TRAINING COSTS

(excluding development costs)

Driver Time*	Total Hours	Total Cost
Sensitivity	6725	$101,615
Operations	1345	$ 20,323
		$121,938
Instructor Time		
Orientation by GWU staff	456	7,629
Training Drivers	442	7,395
		$ 15,024
GWU Trainer Time**	118	$ 4,425
Materials		$ 12,105
TOTAL		$153,492

*Based on an average driver rate of $15.11 per hour (including benefits).
**Based on an average instructor rate of $16.73 per hour (including benefits).
***Based on an average trainer rate of $37.50 (including benefits and overhead).

development of the program and materials, was about $153,000 or was $57 per driver. The training costs were funded primarily by the demonstration. Note that new drivers are trained in lift operation during the course of the regular training program and this cost has not been included.

7.4.1.5 Marketing - WMATA's direct lift-bus marketing efforts were relatively limited. They consisted primarily of a distribution of brochures and flyers at the start of service in July 1979 and radio and television public service announcements run periodically throughout the demonstration. As Table 7-4 shows,

TABLE 7-4. MARKETING COSTS

		Cost
Staff Time ($25,000 plus 30% benefits)		
o Coordination	100 hrs.	$ 1,625
o Brochures	30 hrs.	488
o Public Service Announcements (Radio and TV)	60 hrs.	975
TOTAL	190 hrs.	$ 3,088
Materials and Contracted Services		
o Brochures		
- Design		$ 300
- Printing		1,100
o Additional Information		400
o Public Service Announcements		
- Radio		200
- Television		7,000
TOTAL		$ 9,000
TOTAL MARKETING COSTS		$ 12,088

preparation of the television spot (done under contract with an advertising firm) accounted for more than 75% of the $9000 expended on marketing materials during the demonstration. Although marketing costs were not originally included in the UMTA grant, a reprogramming of the budget enabled funding of the television spot contract. About 190 hours of Office of Marketing staff time were expended preparing the marketing materials, at a cost of $3088 ($25,000 salary plus 30% benefits). These additional costs were not funded by the grant.

The service was marketed indirectly through several methods whose costs are attributable elsewhere. For example, lift-bus information was contained in schedules of routes with accessible service. WashCOG included a detailed discussion of the lift-service and how to use it in its "Directory of Special Transportation Services," published in March 1981. Finally, the WMATA field demonstrations, in addition to helping potential users become familiar with the lift equipment, also served as an advertisement. (Television crews attended at least the first lift demonstration session.)

7.4.1.6 Outreach (User Training) - A Field Demonstration Supervisor was hired for one year to plan and conduct the 25 WMATA neighborhood lift-bus demonstrations. This was also a demonstration-funded position and cost $19,400. Other WMATA staff members were involved in this effort, including Public Affairs staff who publicized the demonstrations.

7.4.1.7 Administration Costs - It is difficult to calculate the administrative costs associated with the accessible bus project since WMATA did not maintain detailed records of staff time spent on the project and since so many offices within WMATA participated at some time during the planning, implementation and operation phases. Table 7-5 summarizes the involvement of these various offices. The major expenses are highlighted in the following discussion.

A Lift Bus Project Coordinator was hired by the Office of Financial and Policy Planning to coordinate WMATA and GWURTC driver and user training programs, to serve as liaison between WMATA and potential lift bus users, and to supervise the marketing, outreach, and data collection efforts. The coordinator was largely responsible for detailed planning immediately preceding the demonstration and for demonstration monitoring once the project had begun. The Coordinator was hired in January 1979 at a salary (including benefits) of $25,000 annually. This position was funded by the demonstration grant.

Other WMATA staff people in the Office of Financial Policy and Planning and the Office of Services Planning (now Transit Engineering and Evaluation) were also involved in the planning which led to the development of the demonstration concept. The latter office also assisted in providing data on schedule changes each quarter while the former provided ridership tabulation and other data for the evaluation.

While an accurate estimate of administrative costs is not possible, data provided by WMATA suggests that in addition to the costs of the Lift Bus Project Coordinator and the Lift Bus Shop Supervisor, at least $75,000 was expended by other staff members over the course of the project, exclusive of data collection activities. It is roughly estimated that 50% or less of this amount was devoted to start-up activities.

7.4.2 Ongoing Costs

7.4.2.1 Repair/Maintenance Costs - In anticipation of substantial lift-related repair problems WMATA added one specially-trained lift mechanic to the staff at each garage and one at the main repair facility at the start of the lift project. An

TABLE 7-5. ADMINISTRATIVE ROLES

Office	Role
Equipment Design	Preparation of specifications, and review of modifications.
Planning	UMTA relations, coordination and monitoring, representation of WMATA in regional planning for disabled, selection of routes and other planning functions.
Bus Services	Administration of the driver training program, recordkeeping, and supervision of operations and maintenance.
General Administration	Hiring of personnel, and review of sensitivity training material.
Security	Issuing handicapped identification cards.
Accounting	Financial recordkeeping.
Marketing	Preparation, supervision and distribution of all marketing material.
Public Affairs	Handled relations with the handicapped community and publicized field demonstration for consumers.
Counsel	Legal counsel throughout the project.
Purchasing	Acquired equipment for training purposes.
Service Planning	Detailed planning of accessible schedules in response to changes in route structure.

additional mechanic was added at the central shop about mid-way through the demonstration. The average rate of pay for these mechanics in 1981 was $16.75 per hour (including benefits). The lift mechanics were not really new employees, but were current WMATA mechanics who applied to fill the new lift mechanic positions. No additional mechanics were actually hired to replace them, since the WMATA fleet was simultaneously being reduced in size. In fact, monthly records show that over the course of the demonstration the lift mechanics were spending only about 60% of their time servicing the lifts and the remainder working on non-lift repairs to the fleet.

Table 7-6 summarizes repair/maintenance costs for lift buses and for a comparison group of non-lift buses of the same make and age. Lift-related maintenance and repair accounts for just over 7% of total maintenance and repair costs for lift-equipped buses. The total parts and labor cost for the lift buses is on average 24% higher than the costs for non-lift equipped vehicles. As Figure 7-1 shows, the lift/non-lift bus cost difference remained relatively consistent over the 8-month sample period. However, only about 38% of this difference can be accounted for by parts and labor costs directly related to the lift equipment.* Since average monthly mileage over the sample period was significantly and consistently higher for lift vs. non-lift equipped buses (see Figure 7-2), it seemed probable that mileage-related costs accounted for a substantial portion of the remaining cost difference. This hypothesis was supported by the results of a regression analysis which used total parts and labor maintenance/repair costs over the sample period as the dependent variable and lift/non-lift bus status, total sample period mileage, and cumulative bus mileage at the end of the sample period as independent variables. The regression indicated that total sample period mileage was by far the most significant factor explaining cost variance between lift and non-lift buses; lift/non-lift status was moderately significant; and cumulative bus mileage was not significant. However the overall R^2 value (regression coefficient of determination) is only moderately high (0.68), indicating additional variance exists in the data that is not explained by the regression model. (Unfortunately, lack of data made it infeasible to include additional variables in the model calibration.)

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*There is some strong feeling among WMATA staff that recorded lift-related parts figures were underreported, possibly by as much as 50%. If this were true, then the lift-related component of maintenance and repair would actually be 10% of total maintenance and repair, and would account for 50% of the observed difference in cost between lift and non-lift buses.

TABLE 7-6. COMPARISON OF LIFT/NON-LIFT BUS MAINTENANCE AND REPAIR COSTS

	Average Cost per Month	Average Cost per Month per Bus
Lift-equipped buses		
o Lift-related costs*		
- Lift Parts	$ 8,565	$ 57
- Lift Labor**	$ 15,243 (910 hrs.)	$ 101 (6 hrs.)
	$ 23,810	$ 158
o Non-lift related costs	$299,632	$1,984
TOTAL	$323,442	$2,142
Non-lift-equipped buses***		
TOTAL	$260,626	$1,726

*Lift-related costs are based on actual statistics for the entire 151-bus fleet. Non-lift related costs are based upon statistics from a 50 bus sample, extrapolated to the entire fleet.

**Repair labor is reported at an average hourly cost of $16.75 (including benefits).

***Figures are based on statistics from a 50-bus sample of the same model and age as the lift bus fleet, extrapolated to a 151-bus fleet.

The regression model allocates $220 of the total average monthly per bus repair and maintenance costs to lift-related factors. Actual data show lift-related costs to be only $158. However, it should be kept in mind that the lift-related parts costs are considered much less reliable than the total parts and labor statistics maintained for the 50 lift-bus sample used in the comparison of overall lift and non-lift repair and maintenance records. If the parts costs were indeed underreported by 50%, the lift-related component of lift-bus repair and maintenance would be almost identical with that allocated by the model.

Figure 7-1

AVERAGE MONTHLY MILEAGE COMPARISION OF LIFT/NON-LIFT BUSES

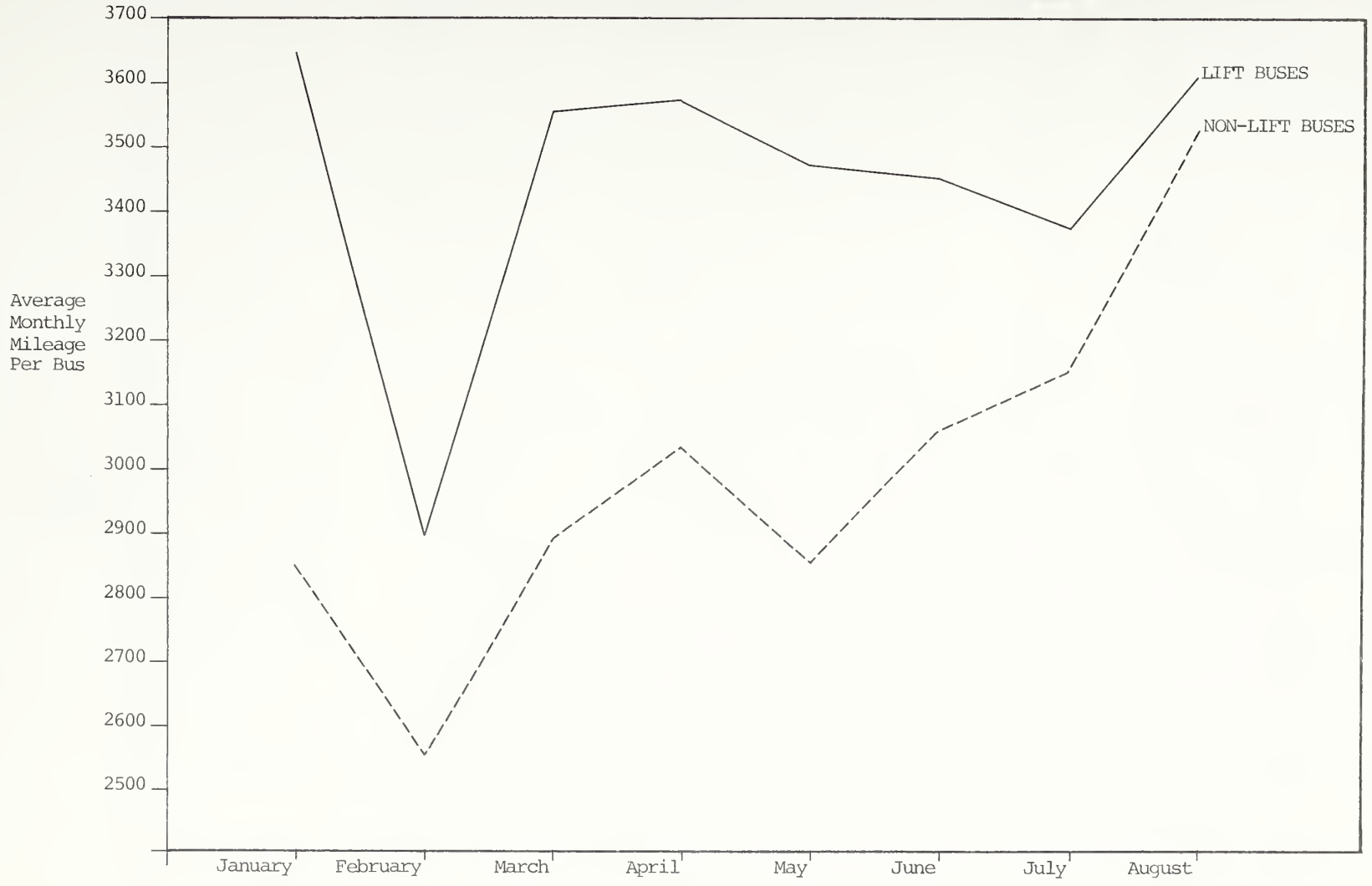
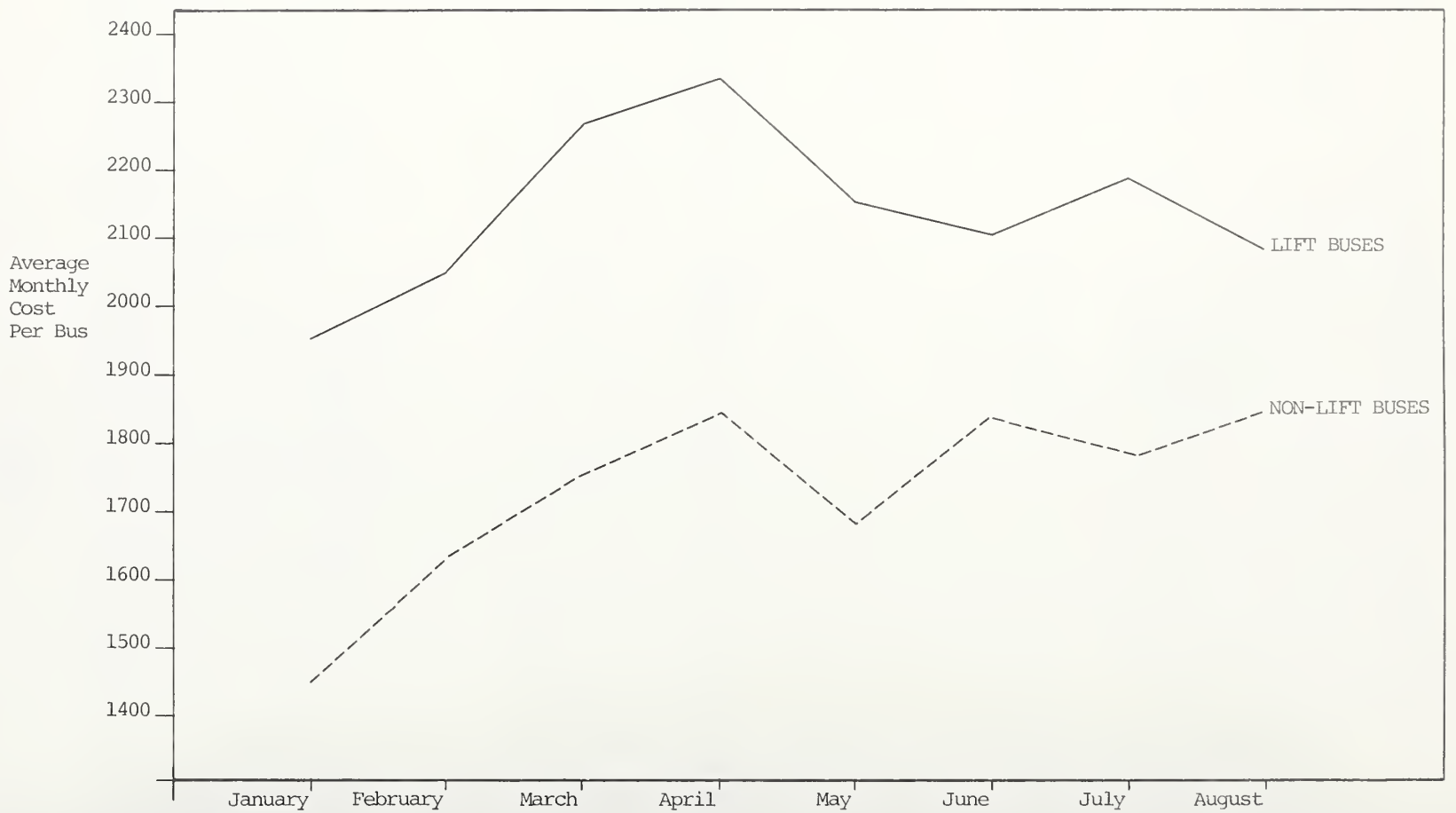


Figure 7-2

AVERAGE MONTHLY REPAIR AND MAINTENANCE COST COMPARISON OF LIFT/NON-LIFT BUSES



7.4.2.2 Other Operating Labor Costs - No other additional operating personnel were hired in conjunction with the demonstration. The possible future need for additional drivers had been raised during demonstration planning. However, this was not necessary since no additional vehicles were required for service.

While the lift did not directly impact operator hours, it should be noted that street supervisors did devote time to the lift service. In the early stages of the project, they were present for lift boardings whenever possible; later in the project, they simply responded to trip denials. There is no estimate available for the cost of their efforts. In any event, it did not increase the staffing requirement for these positions.

7.4.2.3 Accident Claims - The few accidents involving lift passengers resulted in no liability claims. However, one $2000 claim was processed for damage to a wheelchair.

7.4.2.4 Driver Training - New bus operators receive lift training as part of their regular driver training program. We can estimate that the cost of the lift component is four hours of driver time for each new hiree at the starting wage rate of $3.35 per hour. Based upon WMATA's experience over the project period of adding 350 drivers annually, the cost of ongoing training totals $4,690 per year. If instructors held training classes of 20 operators each, their time would cost an additional $1,170 per year. Thus, the total ongoing training cost would be $5,860 per year. Because information about WMATA's refresher training program is unreliable and because the procedures appear to be ad-hoc in nature, we have not included an estimate of refresher training costs in ongoing expenses.

7.4.2.5 Marketing - WMATA did not incur ongoing marketing costs, since it does not regularly advertise its accessible service, aside from the airing of public service announcements. Changes in the service will require some new marketing materials; however, the restructuring of the lift program cannot be viewed as an "ongoing" expense.

7.4.2.6 Administration - Ongoing administrative costs include $25,000 per year for the Lift Bus Project Coordinator and another estimated $25,000 for the time of other WMATA staff members in various departments, as described in Table 7-5.

Personnel in the Office of Bus Services (were directly responsible for supervising operations and maintenance. A Lift Bus Shop Supervisor was employed at a cost of $30,000 per year

to WMATA, a cost not covered by the demonstration grant. (This was a part-time responsibility of a full-time employee). He was also responsible for providing various maintenance data for the evaluation. The Office of Bus Services was responsible for compilation of repair, maintenance and ridership statistics, and administration of the driver and on-board surveys. Division clerks prepared detailed monthly logs on repairs to the lifts and semi-weekly lift status reports.

Drivers were responsible for collecting lift ridership counts which took place approximately one week a month over the course of the demonstration. Since ridership was so low, however, this did not amount to a significant amount of total driver time. Similarly, handing out surveys to boarding passengers for one day on a sample of runs was also a minimal effort in the context of other driver duties.

7.4.3 Cost Summary

Table 7-7 summarizes the costs of the accessible bus project excluding the costs of data collection and George Washington University's costs (for training program development, evaluation, data collection and allied health training). It is difficult to compute a single total cost that will be meaningful to other transit operators, primarily because the costs are not reported for a single time frame, and it is unclear how often some of the costs will recur. For example, the capital costs and training costs reflect costs that are recurring on a cycle of several years, while operational costs are an annually recurring cost. In some cases, a portion of the cost is a one-time expenditure. Therefore, we must make some assumptions and approximations to calculate annual costs and cost per trip.

If we assume that the lift equipment has a ten year life, we can compute a cost of lift service on an annual basis. As shown in Table 7-8, this totals $631,313, of which $196,252 represents capital costs amortized over 10 years. This results in a cost per lift trip of $329, including capital costs, and $227, including only operating costs.

It is evident that while the WMATA Accessible Bus Project did not have significant effects on schedules or drivers, it has been quite costly for the operator. The low level of utilization has been a factor in minimizing the former impacts but has made per trip costs excessive. One can only speculate

TABLE 7-7. SUMMARY OF WMATA ACCESSIBLE BUS PROJECT COSTS*

A. Start-up Costs		
Equipment Capital Costs		$ 996,600
Maintenance and Equipment Acceptance		$ 30,900
Mechanic Training		$ 11,000
Driver Instructor Training		$ 7,629
Driver Training		
- Operations	$ 20,323	
- Sensitivity	$101,615	
- Instructor Time	$ 7,295	
- GWU Trainer and Materials	$ 16,530	
		$ 145,763
Marketing		
- Staff	$ 3,088	
- Materials	$ 9,000	
		$ 12,088
User Training		$ 19,400
Administration		
- Lift-Bus Project Coordinator	$ 18,750	
- Miscellaneous Staff Time	$ 37,000	
		$ 55,750
		$1,279,130
B. Ongoing Costs		
Lift Repair and Maintenance		
- Mechanics' Time and Parts	$285,720/year	
- Lift-Bus Shop Supervisor	$ 30,000/year	
		$315,720/year
Accident Claims		$ 1,000/year
Administration		
- Lift-Bus Project Coordinator	$ 25,000/year	
- Miscellaneous Staff Time	$ 25,000/year	
		$ 50,000/year
Training		$ 5,860/year
Marketing		0
		$372,580/year

*Excludes data collection, training program development, and WMATA overhead.

TABLE 7-8. COST PER TRIP

	Amount	Year	Life	Annual Cost	1981$
Start-Up Costs:					
Equipment Purchase	$996,600	1978	10	$147,447	$196,252
Equipment Acceptance	$ 30,900	1979	10	$ 4,572	$ 5,532
Staff Training	$164,392	1980	10	$ 24,322	$ 26,754
Marketing and User Training	$ 31,688	1979	3	$ 11,584	$ 14,017
Administration	$ 55,750	1979	5	$ 13,370	$ 16,178
Operating Costs	$372,580	1981	1	$372,580	$372,580
TOTAL ANNUAL COST					$631,313
TOTAL ANNUAL COST PER SCHEDULED BUS					$ 6,645
OPERATING COST (include all start-up costs except equipment purchase)					$435,061
OPERATING COST PER SCHEDULED BUS					$ 4,580
ESTIMATED ANNUAL RIDERSHIP (based on 40 trips per week)					1,920
TOTAL COST PER LIFT TRIP					$ 329
OPERATING COST PER LIFT TRIP					$ 227

what the impacts of greater lift utilization might be for the operator. It is noteworthy that for per trip costs to be reduced to levels consistent with demand-responsive transportation (i.e., about $12), ridership would have to increase more than 25-fold. (No suggestion is made here that the service levels would be equivalent.)

8. CONCLUSIONS

This section summarizes the key results of the demonstration and presents some conclusions about the value of partially-accessible fixed-route service. Results are described in the following areas:

1. Equipment
2. Planning and Implementation
3. Service Quality
4. Ridership and Travel Behavior
5. Operator Impacts
6. Transferability of Conclusions

8.1 EQUIPMENT

The lift equipment and wheelchair tiedown devices used in this project represent relatively new equipment designs. From the user point of view, these devices were successful in that they presented no significant physical difficulties, although the seat belts were made optional since they were inconvenient some modifications to the bus interior created difficulties for some other riders.

From the operator point of view, the lifts were significantly less successful. Driver error in operating the lift was a factor which contributed to high repair costs and substantial out-of-service time. Improvements to the lift were necessary to correct for design flaws which rendered the lift vulnerable to such damages. Following these modifications, more satisfactory lift performance was achieved, but the problem of damages due to driver actions still remained. While more driver training and accountability could possibly have reduced these expensive repairs, questions remain as to the extent to which additional devices must be incorporated in the lift mechanism to safeguard against driver error.

The frequent need for repairs reduced the availability of service. However, evidence suggests that availability of lift service could have been improved. The lift bus out-of-service

rate did not exceed the overall lift-bus spare ratio; however, an uneven allocation of spares among garages created shortages at some locations. Better distribution and management of spares could possibly have improved service levels and reduced the necessary spare ratio. Furthermore, lift mechanics were not fully utilized in the repair of lifts but were diverted to other tasks. Had they been fully allocated to lift repairs, service reliability may have been increased.

8.2 PLANNING AND IMPLEMENTATION

Training activities and marketing were key elements of the demonstration and involved a unique program of cooperation between GWU and WMATA. Extensive coordination between WMATA and GWU, which involved staff time from various WMATA departments, was necessary to achieve a training program that incorporated the necessary human service elements in the context of transit. The driver training program in handicap awareness developed by GWURTC and carried out by WMATA, as well as WMATA's lift operation skills training, were highly regarded by the drivers. However, WMATA's public image might have benefitted from having all drivers trained before the project began, as there were instances of driver error and confusion that stemmed from a lack of training. Furthermore, low ridership meant infrequent opportunities for many drivers to operate the lift in service and made refresher training important. Although refresher training was not provided for in the grant, it was made available, at least on an ad-hoc basis.

Consumer training (including field demonstrations) reached only limited numbers of people. Nevertheless, it included over one third of lift-users surveyed; almost one quarter indicated it was the factor which most influenced them to try the service. This suggests that the consumer training was an important aspect of the project. Perhaps an expanded program of consumer training would have been instrumental in developing ridership had service quality been better.

Start-of-service marketing efforts were not extensive and primarily involved public service announcements, a flyer and a brochure. As the project proceeded, the poor quality of service limited the potential of any additional marketing.

Local human service agencies appear to have exercised little or no role in promoting the service. The training program for rehabilitation professionals was unfortunately scheduled too late in the project to allow any meaningful evaluation

of its effects on ridership. It also appears to have focused on the wrong group of professionals. GWU has recommended that future programs focus on rehabilitation and vocational counselors rather than acute care professionals whose clients are typically not ready to use public transportation.

Coordination with GWU, various WMATA departments and outside agencies was a key element of the demonstration implementation. As a result, special funding was provided for a Lift-Bus Project Coordinator. However, the placement of the Coordinator and the ultimate responsibility for the project in the Office of Financial Policy and Planning rather than in the Office of Bus Services created an unnatural division between operations and management. Had the Coordinator been within the Office of Bus Services there might have been greater accountability and responsiveness in resolving service deficiencies.

Greater coordination with other agencies might have improved service effectiveness. As previously noted, human service agencies could have played a more significant role in marketing. Most importantly, better coordination of the accessible bus service implementation with curb cut programs might have boosted ridership, as curbs were identified in the surveys as an important barrier to using the bus. Unfortunately, curb cuts are outside WMATA's jurisdiction.

8.3 SERVICE QUALITY

From the point of view of the user and potential user, the quality of the accessible bus service was lacking in several respects. Because the service was designed to be only partially accessible, lift-users were provided with lower frequency service than the general public and less dense coverage. Clearly, this leaves us to question the viability of the "partially accessible" service concept.

While users favored a fixed-route service over a separate door-to-door system by 2 to 1 and while even many non-users believed fixed-route service to be a convenient means of travel if a bus stop were located nearby, the surveys suggest that areas without very dense transit networks will not be able to rely solely on fixed-route service on meet the mobility needs of disabled people.

The deficiencies in service characteristics were exacerbated by the poor reliability of the service. Operating policies (e.g., preventive maintenance and dispatching procedures)

varied among the divisions and were reflected in different levels of service reliability. Denials of service, which constituted about one of nine attempted boardings, were the most significant problem with the service according to surveyed users.

It appears that fears about physical abilities and safety and security while using the bus are not key issues. Users had very little difficulty with the lift mechanism and non-users generally felt they would be physically able to use the bus. Nevertheless, barriers to using the bus included more than just the level change (steps), but encompass a variety of functions associated with bus travel. Furthermore, both users and non-users indicated the significant barrier to using the fixed-route bus posed by curb cuts. While WMATA had little control over such barriers, they are a significant problem to be overcome for any fixed-route accessible service. This suggests that for many individuals, even reliable lift devices will not be enough to enable them to ride fixed-route bus services.

8.4 RIDERSHIP AND TRAVEL BEHAVIOR

Lift ridership was very low (about 7-8 boardings per day); however, similar ridership levels were experienced in several earlier implementations of lift-equipped fixed-route service. Several factors are responsible for this poor ridership response: service reliability, service design, media influences, and availability of more convenient travel modes.

As was the case in several of the earlier implementations, service reliability was poor. Because about 20% of lift runs had non-accessible buses or inoperable lifts, the service was quite undependable.

Given the poor reliability of the service, it is difficult to be conclusive about the impact of the service design; however, it appears that service quality in terms of both coverage and frequency were insufficient to draw a considerable ridership. Lack of convenient routes and schedules and barriers on the access trip (curbs and distances) were major complaints of users and non-users. Survey results suggest that most disabled people are not willing to travel the distances necessary to reach a bus stop. Furthermore, without substantial improvements to the accessibility of the environment (e.g., curb cuts), many individuals will find the access trip extremely difficult.

Media reporting of the poor performance of the Metrobus lift service highlighting the high rate of service denials may have influenced non-users not to try the service. Thus, surveys indicated that non-users' perceptions of the service were characterized by poor reliability and lack of driver skill.

While each of these factors contributed to the low level of ridership, it is also likely that low ridership in turn contributed to the fact that service did not improve over the course of the demonstration. Had a higher level of ridership developed, there might have been greater pressure to improve both driver skills and lift service reliability.

In addition to inconveniences associated with the lift-bus, surveys suggested that availability of other modes was a primary reason why non-users had not tried the lift service. It is important to note that physical inability to use the lift-bus was not a significant issue for the majority of non-users.

The users appeared to be a committed group who favored the concept of fixed-route accessibility and were willing to make efforts to use the lift-bus despite the inconvenience and difficulties they encountered, and the availability of more convenient modes. Nevertheless, by May 1981 only about six individuals of thirty contacted in a follow-up survey were still riding the lift-bus. Service unreliability may have contributed to the loss of their patronage.

The small group of riders were atypical of the target population. They were disproportionately male, young, affluent and mobile. Although the lift was available for semi-ambulatory individuals, most riders were in wheelchairs.

There appears to be a trade-off between self-reliance and convenience. The users chose to use the lift-bus despite its lower convenience. For the majority of the disabled, the lift-bus lost out to less self-reliant but more convenient modes, such as agency transportation and rides with family or friends.

8.5 OPERATOR IMPACTS

The level of lift utilization was too low to have any significant impact on run, dwell and layover times. Thus, schedule changes that WMATA planners had initially thought might be necessary as the accessible bus project progressed, were never required. Since no schedule changes were required, the introduction of accessible service did not increase WMATA's scheduled vehicle (or driver) requirements.

WMATA did, however, maintain a higher than normal spare ratio for its lift-equipped fleet since experience in other locations had shown the incidence of lift-bus equipment problems to be significantly higher than the overall fleet average. This proved to be the case in Washington as well, where 20% of lift-buses were out of service on average. However, at some garages the lift-bus spare ratio was in excess of requirements, and these additional vehicles were used as spares in regular service.

Despite the fact that a significant number of drivers reported equipment problems and considered the lift unreliable, few indicated negative attitudes towards the accessible service. The lack of substantial driver reaction is most likely also due to the very low level of lift utilization, which has reduced the potential burden of lift-related responsibilities (e.g., passenger assistance) on the driver. Drivers generally felt the operations and sensitivity training sessions were very valuable.

The lift-equipped buses did cost more than non-lift-buses to maintain and repair; but this was true in part because the lift-buses were more heavily utilized (i.e., incur greater mileage). Only about 7% of maintenance and repair costs were directly lift-related ($158 of a total average monthly per bus cost of $2142). However, on a per trip basis the repair and maintenance costs involved in providing accessible service were high, about $150 per trip. The total operating costs of the project are estimated to have been over $400,000 per year, including annualized costs of training and marketing. The operating cost per lift trip was $227 per trip due to the low ridership. When capital costs are included, cost per lift trip is estimated to have been as high as $329. While the above figures are only rough estimates due to cost data inadequacies, it is clear that the per trip costs are quite excessive.

8.6 TRANSFERABILITY OF CONCLUSIONS TO OTHER SITES

The conclusions drawn from the Washington experience may help other transit properties to plan services to meet the mobility needs of disabled people, insofar as these conclusions are transferable. In general, the conclusions of the evaluation should be applicable to other areas. There are several factors, however, which may have influenced the results of the Washington demonstration sufficiently to preclude transferring some of the results to other sites with different characteristics.

Washington has an accessible rail system which was the primary focus of disabled representatives' input to the authority. Had there been no rail system there may have been more pressure to improve the reliability of the accessible Metrobus service.

WMATA is a large and compartmentalized authority; while the Lift Bus Program was officially under the jurisdiction of the Office of Financial Policy and Planning, its operation fell under the control of the Office of Bus Services. This limited accountability and responsiveness. In smaller transit properties better results might have been achieved given a similar situation.

The full potential of accessible fixed-route bus service can only be measured where environments are also accessible (e.g., curb cuts, etc.) and where level of service characteristics for disabled and able-bodied persons are equivalent (e.g., coverage, frequency of service and reliability are essentially identical). The WMATA experience serves only to confirm that partially accessible fixed-route bus service which is scheduled relatively infrequently and which experiences significant reliability problems cannot attract a significant number of riders.

APPENDIX A: WMATA LIFT OPERATION GUIDELINES

1. Pre-trip Inspection*

   a. Operate the lift through an entire cycle of operation.
   b. Fold right-side convertible seat.
   c. Make sure that wheelchair identification plate on front of bus is displayed.

2. Eligibility

   All passengers with obvious mobility problems, who are unable to go up and down the boarding steps even when the bus is in a kneeling mode, will be entitled to use the lift on lift-equipped buses. An attendant will be allowed on the lift with a wheelchair user or with a semi-ambulatory passenger.

3. Order of Use

   At bus stops where two or more persons (including wheelchair or other lift-users) are waiting to board a bus, the lift-user will board first. When two or more persons (including at least one lift-user) are preparing to alight at the same stop, the lift-user will not be permitted off the bus until the other passengers have alighted. NOTE: Request able-bodied passengers to alight via the back door while the front door is in use for the exiting lift passenger. Overall delay at the bus stop will be reduced when this procedure is followed.

4. Boarding Procedure (For Wheelchair-bound Patrons)

   a. When approaching a stop, select an appropriate boarding location at or near the designated bus stop. The wheelchair lift will be seriously damaged if it is operated at an inappropriate location. Although they are equipped with sensitive edges designed to stop the platform when it touches the ground, malfunctions and ground irregularities (crown in the road, for example) may cause this safety feature not to work. Therefore

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*(Notify the Maintenance Supervisor if any deficiencies exist).

always stand while the lift is in operation and observe its movement. Let go of the "LOWER LIFT" button as soon as the lift contacts the ground. If the lift does not stop, the bus will be raised and serious damage will result. Look for level surfaces to activate the lift, locations free of broken concrete, tree roots, slopes or loose dirt (mud, etc.). Remember, the wheelchair user needs a location suitable for straight ahead boardings and alighting from the platform.

b. Deploy lift; the disabled person boards first.

c. Determine if the wheelchair passenger requires assistance;

   1. If requested, alight (rear door or lift).
   2. Ask user to secure their wheelchair in preparation for the lift being raised.

d. Raise lift and assist in fare handling (if required). Keep lift extended.

e. Assist passenger at the tie-down location and in securing wheelchair (belt and arm restraint).

f. Return to operator's seat, return lift to step configuration, and permit remaining patrons to board.

5. Operation of Bus With Wheelchair Aboard

a. Ask disabled rider for their destination when boarding.

b. Make period visual checks on rider to insure chair is secure.

6. Alighting of Wheelchair

a. Select an appropriate site at or near desired stop.

b. Wheelchair alights last, other riders alight first; encourage alighting passengers to exit from rear doors. Announce to entering passengers that wheelchair will alight before they can board.

c. Assist in the removal of restraints on chair.

d. Activate lift.

e. Assist patron in positioning and locking wheelchair on platform.

f. Lower lift.

g. Assist alighting if requested.

h. Fold lift to step position (unless another disabled person is waiting).

7. Ambulatory Individuals With Impaired Mobility

In addition to wheelchair passengers, the kneeling and lift features will enable persons to board who have difficulty in walking or negotiating the steps on the bus. Utilize the kneeling feature whenever the bus cannot be curbed. Passengers with disabling physical impairments such as arthritis, may request the kneeling or lift provisions.

Observe the following when standees request the use of the lift-bus:

a. Ask the passenger if they would like assistance.

b. Make sure that the passenger stands on the platform of lift as far into the bus as possible and holds onto the stanchion that moves with the platform.

c. Tell the passenger when you are ready to activate the lift. The same boarding and alighting policies that are applied to wheelchair passengers pertain to these individuals.

8. Provision or Denial of Lift-Bus Service

Lift-equipped service will be made available to disabled individuals who wish to ride on designated lift-equipped trips. In addition, operators operating lift-equipped buses on trips immediately following the scheduled accessible service are also required to allow disabled passengers to board.

In the event that the bus operator knows that the lift is inoperable, or if both wheelchair tie-down locations are already occupied by wheelchair users, the operator of a lift-equipped bus will stop to so advise and will inform the waiting lift passenger of the probable (scheduled) time of arrival of the next lift-equipped bus.

If a lift is inoperable on a scheduled lift-bus trip, the driver will cover (reverse) the lift-bus sign on the front of the vehicle.

9. Assistance by Operators

Operator will provide instructions and assist wheelchair users and other passengers to enable wheelchair to be boarded and unloaded:

1. by directing the wheelchair user in the loading/unloading process;

2. by requesting passengers seated on the fold-up benches at tie-down locations to give up their seats so that wheelchair can be secured;

3. by folding up the inside convertible bench seat.

10. Fare Collection

A lift passenger may be accompanied by one attendant who pays half-fare, provided that the attendant has a Metro I-D card which specifies that the half-fare privilege applies only when the attendant is with the disabled user.

The lift-user is expected to deposit fares the same way everyone else does. However, if upper body disabilities prevent this, the bus operator is authorized, as at present, to assist to making the fare payment.

11. "Kneeling" Action

The kneeling action of the new buses -- identified by a light in the front entrance corner, (which has a picture of a person with a cane superimposed) -- is available by request to reduce the hight of the first step when the bus cannot get to the curb.

12. Procedures

While the operator may request the user to board in a particular manner, the wheelchair passenger may choose whether to use the lift platform in a forward or back-facing mode, whichever is most comfortable for the individual. In cases where an attendant is accompanying the wheelchair user, the attendant is required to stand closest to the operator on the first movable section of the platform, with the wheelchair facing the outside of the bus.

13. Emergencies

Operational: In an emergency, the bus operator will call Central Control. Street Supervisor(s) will be responsible for the physical transfer of wheelchair passenger or other lift-user to another vehicle, (lift-bus or patrol vehicle) and for seeing that the disabled passenger is able to complete this trip.

Medical: Existing procedures on medical emergencies apply to lift-bus service.

PLEASE REMEMBER:

Your disabled passengers will be your most valuable guide in serving their needs. Establish communication with them; their requirements will become considerably more clear and understandable.

APPENDIX B-1: RESULTS OF THE USER SURVEY

SURVEY OF METROBUS LIFT-USERS IN THE WASHINGTON METROPOLITAN AREA

Good Day!

This survey is being conducted by the George Washington University in cooperation with the Federal Department of Transportation. As you may know, WMATA has specially equipped many of its Metrobuses with lifts at the front door so that wheelchair users and other passengers who have difficulty climbing stairs can use the Metrobus service. (When we refer to regular Metrobuses we mean those without the special lifts. Metrobus, is a fixed-route service, that is, the buses travel on designated routes and do not make special detours to pick up passengers off the route.)

The federal government will use the results of this survey to evaluate how successful the lift-equipped buses are in providing transportation to disabled residents of the Washington metropolitan area.

Please help us improve transportation for everyone by taking some time to complete this survey. Your cooperation is very much appreciated.

1. Are you able to travel by regular Metrobuses (non lift-equipped)?

   (1) YES

   (2) NO

2. Have you ever used the lift on Metrobuses?

   (1) YES

   (2) NO

If you answered No to Question 2, please stop here and request a NON-USER SURVEY.

A. INFORMATION ABOUT DISABILITY AND/OR HANDICAP

1. Disability: (please check all that apply)

(1) Cerebral palsy
(2) Muscular dystrophy
(3) Multiple sclerosis
(4) Arthritis
(5) Epilepsy
(6) Amputee
(7) Temporary injury
(8) Mental retardation
(9) Blindness/visual impairment
(10) Spinal cord injury
(11) Paraplegic
(12) Quadriplegic
(13) Hemiplegic
(14) Polio
(15) Spina bifida
(16) Orthopedic (bone & joint) impairment
(17) Stroke
(18) Deafness/hearing impairment
(19) Heart/lung impairment
(20) Other _____
(specify)

2. Transportation handicap/Functional impairment: (please check those that apply)

(1) Difficulty climbing stairs
(2) Difficulty maneuvering through crowds
(3) Difficulty waiting outside for buses
(4) Difficulty standing in moving vehicles
(5) Difficulty maintaining balance while bus stops and starts
(6) Unable to reach or hold grips
(7) Difficulty walking
(8) Communication difficulty
(9) Visual difficulty
(10) Difficulty in understanding the system

3. What aids do you use when travelling outside of the house?

(1) Wheelchair

(2) Walker
(3) Crutches
(4) Walking cane
(5) Braces
(6) Artificial limb
(7) Guide dog
(8) White cane
(9) Other _____ (specify)
(10) None

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For Wheelchair Users (only):

4. Do you always use a wheelchair when outside of the house?

(1) Yes
(2) No

5. Are there curb cuts in the vicinity of your residence?

(1) Yes
(2) No
(3) No curbs

6. What type of wheelchair do you use?

(1) Manual - narrow
(2) Manual - standard
(3) Manual - wide
(4) Manual - junior custom
(5) Power drive - conventional model
(6) Power drive - Amigo
(7) Power drive - Abec
(8) Power drive - other
(9) Both power and manual

B. TRANSPORTATION

1. Do you (or does someone in your household) own a car?

   (1) Yes

   (2) No

2. Other than regular lift-equipped Metrobus service, what means of travel are frequently available to you? (check all that apply)

   (1) Drive automobile/van

   (2) Obtain a ride from a member of my household

   (3) Obtain a ride from a friend

   (4) Human (social) service agency transportation

   (5) Taxi

   (6) Private wheelchair-van service

   (7) Metrorail (subway)

   (8) Other _____
   (specify)

3. If each of the following were available, which would you be physically able to use? (check all that apply)

   (1) Drive automobile/van

   (2) Obtain a ride from a member of my household

   (3) Obtain a ride from a friend

   (4) Human (social) service agency transportation

   (5) Taxi

   (6) Private wheelchair-van service

   (7) Metrorail (subway)

   (8) Other _____
   (specify)

4. How do you usually travel for:

a. Work/school trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(9) Private wheelchair-van service

(10) Other _____
(specify)

b. Shopping trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(9) Private wheelchair-van service

(10) Other _____
(specify)

c. Medical trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(9) Private wheelchair-van service

(10) Other_____
(specify)

d. Social/Recreational trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(7) Private wheelchair-van service

(8) Other _____
(specify)

e. Personal business trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(7) Private wheelchair-van service

(8) Other _____
(specify)

5. Please indicate below how many trips you made in motor vehicles (of any type). (Count each one-way trip as a trip, each round trip as two trips)

_____ _____ last week

If NONE last week, how many last month

_____ _____ last month

6. How many of these trips were by Metrorail?

_____ _____

7. What most influenced you to try the fixed-route lift bus service? (Please check only one answer)

(1) Radio advertisement/report
(2) TV Advertisement/report
(3) Newspaper/magazine advertisement/ report
(4) Bus demonstration
(5) Human (social) service agency
(6) Word of mouth
(7) Saw bus in operation
(8) Friend recommended it
(9) Escort volunteered to go with me
(10) Health care worker/therapist/counselor

8. How did you learn about the equipped Metrobuses? (check all thay apply)

(1) Radio
(2) TV
(3) Newspaper/magazine
(4) Witnessed lift bus demonstration
(5) Human (social) service agency
(6) Word of mouth
(7) Saw lift bus on street
(8) Health care worker/therapist/counselor
(9) Other _____
(specify)

9.a. Did you participate in a demonstration or receive training in how to use the lift-equipped bus?

(1) Yes
(2) No

b. Whom did you receive training from?

(1) Human (social) service agency
(2) Rehabilitation professional (therapist, nurse, counselor)
(3) WMATA (drove a bus into neighborhood)
(4) Other _____
(specify)

10. How far would you be able to travel to a bus stop

a. In good weather?

(1) 0 blocks

(2) 1 block

(3) 2 blocks

(4) 3 blocks

(5) 4 blocks

(6) more than 4 blocks

b. In rainy or snowy weather?

(1) 0 blocks

(2) 1 block

(3) 2 blocks

(4) 3 blocks

(5) 4 blocks

(6) more than 4 blocks

11.a. Is there a Metrorail stop convenient to your home?

(1) Yes

(2) No

(3) Not sure

b. Is there a bus stop convenient to your home?

(1) Yes

(2) No

(3) Not sure

If Yes, can you catch a lift bus at this stop?

(1) Yes

(2) No

(3) Not sure

c. Would this bus take you to a Metrorail station?

(1) Yes

(2) No

(3) Not sure

12. Assuming that a bus stop is located within an accessible distance of your home, do you think lift-equipped Metrobus is a convenient means of travel for:

a. Work/school trips?

(1) Yes

(2) Sometimes

(3) No

(4) Not sure

b. Shopping trips?

(1) Yes

(2) Sometimes

(3) No

(4) Not sure

c. Medical trips?

(1) Yes

(2) Sometimes

(3) No

(4) Not sure

d. Other

(1) Yes

(2) Sometimes

(3) No

(4) Not sure

C. HAVE USED THE LIFT-BUS SERVICE IN THE PAST (BUT NO LONGER USE)

1. Would you use the service again?

(1) Yes

(2) No

2. If No, why not?

(1) Lift bus does not go where I need to go

(2) Schedule is not convenient

(3) Bus stop is too far

(4) Concerned about safety in the streets

(5) There are not enough curb cuts

(6) Had difficulty getting into the vehicle/off the vehicle

(7) Driver was not helpful enough

(8) Did not feel secure on the lift

(9) Had difficulty maneuvering on the vehicle

(10) Buses are too crowded

(11) Bus ride is uncomfortable

(12) Service was not reliable

(13) Transferring takes too long

(14) Embarassed

(15) Have obtained an automobile

(16) Am no longer transportation handicapped (or in wheelchair)

(17) Am no longer physically able to travel by bus

(18) Need personal assistance to travel by bus

(19) Other _____
(specify)

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D. CURRENT LIFT USERS

1. Has the lift bus service increased the number of trips you make per month?

   (1) Yes

   (2) No

2. Has the lift bus service enabled you to travel to new places and to new activities?

   (1) Very much so

   (2) Somewhat

   (3) Not at all

3. How many (one-way) lift bus trips did you make last week for the following purposes?

   IF YOU MADE NO LIFT TRIPS LAST WEEK ANSWER THE FOLLOWING FOR THE ENTIRE MONTH AND CHECK THIS BOX

   a. Work/School _____ _____

   b. Shopping _____ _____

   c. Medical _____ _____

   d. Other _____ _____

4. How many of these lift trips would you have been unable to make without the lift bus? _____ _____

5.a. How many of these trips involve transfers to other lift buses? _____ _____

   b. How many of these trips involve transfers to Metrorail? _____ _____

6. For your most frequent lift-bus trip:

   a. How much was the fare (one way)?

(1)	20¢ or under	(6)	75¢ - $ 1.00
(2)	21¢ - 25¢	(7)	$1.01 - $ 2.00
(3)	26¢ - 40¢	(8)	$2.01 - $ 3.00
(4)	41¢ - 50¢	(9)	Over $3.00
(5)	51¢ - 75¢		

b. How long does the trip generally take (door to door)?

(1)	5 minutes	(6)	1 hour
(2)	10 minutes	(7)	1-1/4 hour
(3)	20 minutes	(8)	1-1/2 hour
(4)	30 minutes	(9)	1-3/4 hour
(5)	45 minutes	(10)	2 hours or more

c. How did you make this trip before the lift bus service was initiated?

(1) Drove
(2) Was driven
(3) Dial-a-ride
(4) Metrobus
(5) Metrorail (subway)
(6) Metrobus transferring to/from Metrorail
(7) Private wheelchair-van service
(8) Taxi
(9) Human (social) service agency transportation/escort service
(10) Didn't make the trip

d. What was the fare for the trip (one-way) then?

(1)	20¢ or under	(7)	$1.01 - $2.00
(2)	21¢ - 25¢	(8)	$2.01 - $ 3.00
(3)	26¢ - 40¢	(9)	Over $3.00
(4)	41¢ - 50¢	(10)	Free
(5)	51¢ - 75¢	(11)	Not applicable
(6)	75¢-$1.00	(12)	Contribution only

e. How long did the trip generally take (door to door)?

(1)	5 minutes	(6)	1 hour
(2)	10 minutes	(7)	1-1/4 hour
(3)	15 minutes	(8)	1-1/2 hour
(4)	30 minutes	(9)	1-3/4 hour
(5)	45 minutes	(10)	2 hours or more

7. How do you usually get from your home to the bus stop where you catch the lift bus?

(1) Walk/wheelchair

(2) Drive automobile

(3) Obtain ride from a member of my household

(4) Obtain ride from a friend

(5) Other _____
(specify)

8. How far is it from your home to the bus stop where you catch the lift bus?

(1) 1 block

(2) 2 blocks

(3) 3 blocks

(4) More than 4 blocks

9. How long does it take you to get to this bus stop?

(1) 0-5 minutes

(2) 6-10 minutes

(3) 11-15 minutes

(4) 16-20 minutes

(5) 21-25 minutes

(6) 26-30 minutes

(7) more than 30 minutes

10. Do you need personal assistance from an escort

a. To get to the bus stop?

(1) Yes _____
(explain)

(2) No

b. To travel on the lift-equipped bus?

(1) Yes _____
(explain)

(2) No

c. To travel on Metrorail?

(1) Yes _____
(explain)

(2) No

(3) Don't use

d. To travel by taxi?

(1) Yes _____
(explain)

(2) No

(3) Don't use

e. To travel by human (social) service agency or private wheelchair-van transportation?

(1) Yes _____
(explain)

(2) No

(3) Don't use

E. REACTIONS TOWARD LIFT BUSES (All users)

1. What problems have you had with the lift buses, and how serious have these problems been?

	(1) Serious	(2) Medium	(3) No Problem
(a) Lack of convenient bus stops/ routes			
(b) Difficulty getting schedules			
(c) Feeling safe getting to the bus stop			
(d) Getting to the bus in bad weather			
(e) Lack of bus shelters			
(f) Lack of curb cuts			
(g) Buses not arriving on time			
(h) Buses not stopping at curb or accessible location			
(i) Entry denied because lift inoperable			
(j) Getting onto the lift platform			
(k) Feeling secure on the lift			
(l) Driver assistance and courtesy not helpful			
(m) Using the farebox			
(n) Priority seating for handicapped/ elderly not effective			

	(1) Serious	(2) Medium	(3) No Problem
(o) Maneuvering to the wheelchair position			
(p) Crowds in the aisle			
(q) Bus driver moves the bus too soon, loose balance			
(r) Non-wheelchair passenger seated in wheelchair location			
(s) Wheelchair location already occupied			
(t) Securing the wheelchair			
(u) Once in position fear of wheelchair rolling while bus is in motion			
(v) Bus ride is uncomfortable			
(w) Attitude of other passengers			
(x) Feeling safe in the bus			
(y) Fear of crime on the bus			
(z) Fear of inability to leave bus in an emergency			
(aa) Grab rails inadequate			
(bb) Other _____ (specify)			

2. Are the following problems you have experienced in using Metrorail, and how much of a problem are they?

	(1) Serious	(2) Medium	(3) No Problem
(e) Elevators not reliable			
(b) Fear of accidents in Metrorail station/vehicle			
(c) Fear of inability to get in/out of Metrorail station/ vehicle			
(d) Fear of inability to leave Metrorail station/vehicle in an emergency			
(e) Fear of crime in Metrorail station/ vehicle			

3. Which of the following improvements do you feel would be necessary to enhance the lift-equipped service?

	(1) Very Necessary	(2) Somewhat Necessary	(3) Not Important
(a) Better Design of lift			
(b) More help from drivers			
(c) Better design of interior of lift buses			
(d) More curb cuts			
(e) More and better located bus stops			
(f) Greater public awareness			

4. What is your overall opinion of the quality of the fixed-route lift bus service?

(1) Excellent
(2) Very good
(3) Good
(4) Fair,_____
(explain)
(5) Poor,_____
(explain)

5. Do you perceive that other passengers are annoyed by the delays which result from lift operation?

(1) Yes, quite a few
(2) Very few
(3) No
(4) Not sure

6. Would you prefer a door-to-door service?

(1) Yes
(2) No, _____
(explain)
(3) Not sure, _____
(explain)

F. GENERAL USER/NON-USER CHARACTERISTICS

1. Do other people live in your household?

(1) No, live alone
(2) Yes, family
(3) Yes, others

2.a. Which category best describes you?

(1) Full time worker
(2) Part-time worker
(3) Home-based employee
(4) Unemployed, looking for work
(5) Full-time rehabilitation
(6) Sheltered employment
(7) Student
(8) Homemaker
(9) Retired
(10) Unemployed and on disability/public assistance/social security
(11) Other _____
(specify)

b. If unemployed, does lift-bus service increase your chances of getting a job?

(1) Yes
(2) No, transportation is not the major problem
(3) No, lift-bus service does not meet my transportation needs.

3. What is your age?

(1) 10-14	(4) 25-34	(7) 55-59
(2) 15-19	(5) 35-44	(8) 60-64
(3) 20-24	(6) 45-54	(9) 65 or over

4. Are you....?

(1) Male
(2) Female

5. What is your gross annual household income? (This information is for statistical purposes only; if you do not wish to answer, please go on to the next question.)

(1) Under $5,000
(2) $ 5,000 - $ 9,999
(3) $10,000 - $14,999
(4) $15,000 - $19,999
(5) $20,000 - $24,999
(6) $25,000 - $29,999
(7) $30,000 or over

6. Where do you reside?

(1) N.E.D.C.
(2) S.E.D.C.
(3) N.W.D.C.
(4) S.W.D.C.
(5) Fairfax County, Virginia
(6) Arlington County, Virginia
(7) Alexandria, Virginia
(8) Prince George's County, Maryland
(9) Montgomery County, Maryland
(10) Other _____
(specify)

We welcome any other comments you may have concerning this new accessible service. Your time and assistance is most appreciated.

TABLE I-1

Q1: Are you able to travel by regular Metrobuses (not lift-equipped)?

	Round 1	Round 2
Can use regular Metrobus	N/A	41% (9)
Cannot use regular Metrobus	N/A	59% (13)

TABLE I-2

Q2: Have you ever used the lift on a Metrobus?

	Round 1	Round 2	TOTAL
Have tried the lift	100% (27)	100% (22)	100% (49)
Have not tried the lift	-	-	-
Missing	(1)	(2)	(3)

TABLE IA-1

QA1: Disabilities

Type of disability	Round 1	Round 2	TOTAL
Cerebral palsy	4% (1)	9% (2)	6% (3)
Muscular dystrophy	-	4% (1)	2% (1)
Multiple sclerosis	11% (3)	4% (1)	8% (4)
Arthritis	4% (1)	13% (3)	8% (4)
Epilepsy	-	-	-
Amputee	11% (3)	4% (1)	8% (4)
Temporary injury	-	-	-
Mental retardation	-	-	-
Blindness/visual impairment	11% (3)	9% (2)	10% (5)
Spinal cord injury	4% (1)	26% (6)	14% (7)
Paraplegic	21% (6)	22% (5)	22% (11)
Quadriplegic	11% (3)	4% (1)	8% (4)
Hemaplegic	-	-	-
Polio	35% (10)	13% (3)	25% (13)
Spina bifida	-	9% (2)	4% (2)
Orthopedic impairment	14% (4)	4% (1)	10% (5)
Stroke	-	4% (1)	2% (1)
Deafness/hearing impairment	4% (1)	-	2% (1)
Heart/lung impairment	-	-	-
Other	4% (1)	9% (2)	6% (3)
TOTAL RESPONDENTS	28	23	51
Responses per individual	1.3	1.3	1.3

TABLE IA-2

QA2: Transportation handicaps/Functional impairments

Type of handicap	Round 1	Round 2	TOTAL
Difficulty walking (to a bus stop)	43% (9)	88% (21)	67% (30)
Difficulty climbing stairs	86% (18)	88% (21)	87% (39)
Difficulty maneuvering through crowds	43% (9)	71% (17)	58% (26)
Difficulty waiting outside for buses	24% (5)	50% (12)	38% (17)
Difficulty standing in moving vehicles	67% (14)	96% (23)	82% (37)
Difficulty maintaining balance while bus stops and starts	52% (11)	58% (14)	56% (25)
Unable to reach or hold grips	24% (5)	17% (4)	20% (9)
Communication difficulty	19% (4)	4% (1)	11% (5)
Visual difficulty	5% (1)	13% (3)	9% (4)
Difficulty in understanding the system	10% (2)	8% (2)	9% (4)
TOTAL RESPONDENTS	21	24	45
Responses per individual	3.7	4.9	4.4

TABLE IA-3

Use of Aids

QA3: What aids do you use when travelling outside of the house?

Type of Aid	Round 1	Round 2	TOTAL
Wheelchair	87% (20)	75% (18)	81% (38)
Walker	9% (2)	4% (1)	6% (3)
Crutches	22% (5)	25% (6)	23% (11)
Walking cane	9% (2)	17% (4)	13% (6)
Braces	4% (1)	21% (5)	13% (6)
Artificial limb	9% (2)	-	4% (2)
Guide dog	4% (1)	-	2% (1)
White cane	4% (1)	-	2% (1)
Other	-	-	-
None	N/A	4% (1)	2% (1)
TOTAL RESPONDENTS	23	24	47
Responses per individual	1.5	1.5	1.5

TABLE IA-4

QA4: Do you always use a wheelchair when outside of the house?

	Wheelchair lift-users		
	Round 1	Round 2	TOTAL
Yes	100% (18)	78% (32)	80% (32)
No	-	22% (8)	20% (8)

TABLE IA-5

QA5: Are there curb cuts in the vicinity of your residence?

	Wheelchair lift-users		
	Round 1	Round 2	TOTAL
Curb cuts	47% (9)	47% (9)	47% (18)
No curb cuts	47% (9)	53% (10)	50% (19)
No curbs	5% (1)	-	3% (1)

TABLE IA-6

QA6 What type of wheelchair do you use?

	Wheelchair lift-users		
Type of Wheelchair	Round 1	Round 2	TOTAL
Manual - narrow	11% (2)	28% (5)	19% (7)
Manual - standard	37% (7)	44% (8)	41% (15)
Manual - wide	5% (1)	-	3% (1)
Manual - junior custom	11% (2)	6% (1)	8% (3)
Power drive - conventional model	21% (4)	11% (2)	16% (6)
Power drive - Amigo	11% (2)	-	5% (2)
Power drive - Abec	-	-	-
Power drive - other	-	-	-
Both power and manual	5% (1)	11% (2)	8% (3)

TABLE IB-1

QB1: Do you (or does someone in your household) own a car?

	Round 1	Round 2	TOTAL
Car in household	64% (18)	79% (19)	71% (37)
No car in household	36% (10)	21% (5)	29% (15)

TABLE IB-2

QB2: Other than regular lift-equipped Metrobus service, what means of travel are frequently available to you? (Check all that apply.)

Travel mode	Round 1	Round 2	TOTAL
Drive auto/van	54% (15)	57% (13)	55% (28)
Ride with household member	21% (6)	35% (8)	27% (14)
Ride with friend	39% (11)	30% (7)	35% (18)
Human service agency transportation	-	4% (1)	2% (1)
Taxi	43% (12)	48% (11)	45% (23)
Private wheelchair van	4% (1)	4% (1)	4% (2)
Metrorail	43% (12)	57% (13)	49% (25)
Other	14% (4)	-	8% (4)
TOTAL RESPONDENTS	28	23	51
Responses per individual	2.2	2.3	2.3

TABLE IB-3

QB3: If each of the following were available, which would you be physically able to use? (Check all that apply.)

Travel mode	Round 1	Round 2	TOTAL
Drive auto/van	64% (18)	78% (18)	71% (36)
Ride with household member	43% (12)	52% (12)	47% (24)
Ride with friend	57% (16)	65% (15)	61% (31)
Human service agency transportation	25% (7)	39% (9)	31% (16)
Taxi	68% (19)	74% (17)	71% (36)
Private wheelchair van	29% (8)	39% (9)	33% (17)
Metrorail	64% (18)	74% (17)	69% (35)
Other	14% (4)	4% (1)	10% (5)
TOTAL RESPONDENTS	28	23	51
Responses per individual	3.6	4.3	3.9

TABLE IB-4A

QB4A: How do you usually travel for work/school trips?

Travel Mode	Round 1	Round 2	TOTAL
Drive	52% (13)	32% (7)	43% (20)
Ride with household member	12% (3)	9% (2)	11% (5)
Ride with friend	20% (5)	9% (2)	15% (7)
Human service agency transportation	-	-	-
Taxi	32% (8)	18% (4)	26% (12)
Private wheelchair van	4% (1)	5% (1)	4% (2)
Metrobus	56% (14)	46% (10)	51% (24)
Metrorail	36% (9)	36% (8)	36% (17)
Metrobus to Metrorail	16% (4)	-	9% (4)
Other	4% (1)	14% (3)	9% (4)
TOTAL RESPONDENTS	25	22	47
Responses per individual	2.3	1.7	2.0

TABLE IB-4B

QB4B: How do you usually travel for shopping trips?

Travel mode	Round 1	Round 2	TOTAL
Drive	50% (14)	46% (11)	48% (25)
Ride with household member	29% (8)	21% (5)	25% (13)
Ride with friend	25% (7)	17% (4)	21% (11)
Human service agency transportation	-	-	-
Taxi	29% (8)	17% (4)	23% (12)
Private wheelchair van	-	4% (1)	2% (1)
Metrobus	25% (7)	38% (9)	31% (16)
Metrorail	18% (5)	13% (3)	15% (8)
Metrobus to Metrorail	4% (1)	-	2% (1)
Other	-	-	-
TOTAL RESPONDENTS	28	24	52
Responses per individual	1.8	1.5	1.7

TABLE IB-4C

QB4C: How do you usually travel for medical trips?

Travel mode	Round 2	Round 2	TOTAL
Drive	50% (14)	35% (8)	43% (22)
Ride with household member	25% (7)	22% (5)	24% (12)
Ride with friend	18% (5)	13% (3)	16% (8)
Human service agency transportation	-	4% (1)	2% (1)
Taxi	43% (12)	17% (4)	31% (16)
Private wheelchair van	4% (1)	4% (1)	4% (2)
Metrobus	36% (10)	30% (7)	33% (17)
Metrorail	14% (4)	-	8% (4)
Metrobus to Metrorail	4% (1)	4% (1)	4% (2)
Other	4% (1)	-	2% (1)
TOTAL RESPONDENTS	28	23	51
Responses per individual	1.9	1.3	1.7

TABLE IB-4D

QB4D: How do you usually travel for social/recreational trips?

Travel mode	Round 1	Round 2	TOTAL
Drive	54% (15)	44% (10)	49% (25)
Ride with household member	29% (8)	26% (6)	27% (14)
Ride with friend	39% (11)	39% (9)	39% (20)
Human service agency transportation	-	-	-
Taxi	36% (10)	22% (5)	29% (15)
Private wheelchair van	-	9% (2)	4% (2)
Metrobus	32% (9)	39% (9)	35% (18)
Metrorail	25% (7)	26% (6)	25% (13)
Metrobus to Metrorail	7% (2)	17% (4)	12% (6)
Other	-	-	-
TOTAL RESPONDENTS	28	23	51
Responses per individual	2.2	2.2	2.2

TABLE IB-4E

QB4E: How do you usually travel for personal business trips?

Travel mode	Round 1	Round 2	TOTAL
Drive	48% (13)	41% (9)	43% (21)
Ride with household member	22% (6)	18% (4)	20% (10)
Ride with friend	22% (6)	18% (4)	20% (10)
Human service agency transportation	-	-	-
Taxi	41% (11)	23% (5)	23% (16)
Private wheelchair van	-	-	-
Metrobus	37% (10)	50% (11)	43% (21)
Metrorail	37% (10)	36% (8)	37% (18)
Metrobus to Metrorail	15% (4)	9% (2)	12% (6)
Other	7% (2)	5% (1)	6% (3)
TOTAL RESPONDENTS	27	22	49
Responses per individual	2.3	2.0	2.1

TABLE IB-5

QB5: During the last week, about how many (one-way) trips have you made in motor vehicles (of any type)?

Number of Trips	Round 1	Round 2*	TOTAL
1-2	11% (3)	5% (1)	8% (4)
3-5	4% (1)	9% (2)	6% (3)
6-10	39% (11)	41% (9)	40% (20)
More than 10	39% (11)	41% (9)	40% (20)
None, but over 4 this month	-	-	-
None, but 1-4 this month	4% (1)	-	2% (1)
None, none this month	4% (1)	5% (1)	4% (2)
Trips per person per week	N/A	13.7	N/A
Standard Deviation	N/A	10.3	N/A
Range	N/A	0-40	N/A
Median	N/A	10	N/A
Mode	N/A	10	N/A

* Round 2 users were asked an open ended question; for the purpose of this table their answers have been condensed into the categories used in the Round 1 survey.

TABLE IB-6

QB6: How many of these trips (this week) were by Metrorail?

Number of trips	Round 1	Round 2*	TOTAL
1	4% (1)	-	2% (1)
2	4% (1)	19% (4)	10% (5)
3	7% (2)	5% (1)	6% (3)
4	4% (1)	5% (1)	4% (2)
5	-	5% (1)	2% (1)
6-10	11% (3)	10% (2)	10% (5)
11-20	7% (2)	10% (2)	10% (5)
over 20	-	-	-
none	64% (18)	48% (10)	57% (28)

* In Round 2, survey respondents were asked to report exact numbers of trips; for the purposes of this table their responses have been aggregated into categories as in Round 1.

TABLE IB-7

QB7: What most influenced you to try the fixed-route lift-bus service?

	Round 1	Round 2	TOTAL
Radio ad./report	-	-	-
TV ad./report	13% (2)	19% (3)	16% (5)
Newspaper, magazine ad./report	-	-	-
Bus demonstration	27% (4)	19% (3)	23% (7)
Human service agency	-	13% (2)	6% (2)
Word of mouth	13% (2)	25% (4)	19% (6)
Saw bus in operation	13% (2)	13% (2)	13% (4)
Friend recommended it	20% (3)	13% (2)	16% (5)
Escort volunteered to go with me	-	-	-
Health care worker/ therapist/counselor	13% (2)	-	6% (2)

TABLE IB-8

QB8: How did you learn about the specially equipped buses?

Source	Round 1	Round 2	TOTAL
Television	21% (12)	38% (9)	40% (21)
Newspaper/ magazine	17% (10)	33% (8)	35% (18)
Word of mouth	21% (12)	54% (13)	48% (25)
Saw bus on street	16% (9)	13% (3)	23% (12)
Saw WMATA demonstration	10% (6)	21% (5)	21% (11)
Worker/therapist/ counselor	-	4% (1)	2% (1)
Radio	10% (6)	8% (2)	15% (8)
Human service agency	2% (1)	13% (3)	8% (4)
Other	3% (2)	13% (3)	10% (5)
TOTAL RESPONDENTS	28	24	52
Responses per individual	2.1	2.0	2.0

TABLE IB-9

QB9A: Did you participate in a demonstration or receive training in how to use the lift-equipped bus?

	Round 1	Round 2	TOTAL
Participated in a demonstration or received training	39% (11)	39% (9)	39% (20)
No participation or training	61% (17)	61% (14)	61% (31)

QB9B: Whom did you receive training from?[1]

Source	Round 1	Round 2	TOTAL
Human service agency	-	-	-
Rehabilitation professional (therapist, nurse, counselor)	7% (2)	4% (1)	6% (3)
WMATA neighborhood demonstration	18% (5)	17% (4)	17% (9)
Other	4% (1)	17% (4)	10% (5)

[1] Percentages are based on all lift-users, not just those receiving training.

TABLE IB-10

QB10: Distance Willing to Travel to a Bus Stop

Distance	Round 1	Round 2	TOTAL
QB10A: How far would you be able to travel to a bus stop in good weather?			
0 blocks	12% (3)	4% (1)	8% (4)
1 blocks	12% (3)	17% (4)	14% (7)
2 blocks	-	13% (3)	6% (3)
3 blocks	-	13% (3)	6% (3)
4 blocks	24% (6)	13% (3)	18% (9)
Over 4 blocks	52% (13)	42% (10)	47% (23)
QB10B: How far would you be able to travel to a bus stop in rainy or snowy weather?			
0 blocks	44% (11)	21% (5)	33% (16)
1 blocks	16% (4)	33% (8)	24% (12)
2 blocks	4% (1)	13% (3)	8% (4)
3 blocks	4% (1)	8% (2)	6% (3)
4 blocks	8% (2)	8% (2)	8% (4)
Over 4 blocks	24% (6)	17% (4)	20% (10)

TABLE IB-11

QB11A: Is there a Metrorail stop convenient to your home?

	Round 1	Round 2	TOTAL
Yes	19% (5)	25% (6)	22% (11)
No	77% (20)	71% (17)	74% (37)
Not sure	4% (1)	4% (1)	4% (2)

QB11B: Is there a bus stop convenient to your home?

Yes	88% (22)	83% (20)	86% (42)
No	12% (3)	17% (4)	14% (7)
Not sure	-	-	-

If yes, can you catch a lift bus at this stop?

Yes	71% (15)	70% (14)	71% (29)
No	14% (3)	20% (4)	17% (7)
Not sure	14% (3)	10% (2)	12% (5)

QB11C: (If yes) Would this bus take you to a Metrorail station?

Yes	100% (15)	71% (10)	86% (25)
No	-	21% (3)	10% (3)
Not sure	-	7% (1)	3% (1)

TABLE IB-12

QB12: Assuming that a bus stop is located within an accessible distance of your home, do you think lift-equipped Metrobus is a convenient means of travel for:

	Round 1	Round 2	TOTAL
a. Work-school trips?			
Yes	77% (20)	70% (16)	73% (36)
Sometimes	12% (3)	30% (7)	20% (10)
No	12% (3)	-	6% (3)
Not sure	-	-	-
b. Shopping trips?			
Yes	43% (12)	59% (13)	50% (25)
Sometimes	32% (9)	32% (7)	32% (16)
No	25% (7)	9% (2)	18% (9)
Not sure	-	-	-
c. Medical trips?			
Yes	50% (14)	65% (15)	57% (29)
Sometimes	25% (7)	17% (4)	22% (11)
No	21% (6)	17% (4)	20% (10)
Not sure	4% (1)	-	2% (1)
d. Other trips?			
Yes	44% (12)	73% (16)	57% (28)
Sometimes	52% (14)	27% (6)	41% (20)
No	-	-	-
Not sure	4% (1)	-	2% (1)

TABLE IC-1

QC1: Would you use the service again? (This question was asked of former users only)

	Round 1	Round 2	TOTAL
Yes	100% (6)	85% (11)	89% (17)
No	-	15% (2)	11% (2)

QC2: If No, why not? (only 1 person answered)

- o Lift bus does not go where I need to go
- o Driver was not helpful enough
- o Had difficulty maneuvering on the vehicle

TABLE ID-1

QD1: Has the lift bus service increased the number of trips you make per month?

	Round 1	Round 2	TOTAL
Yes	44% (7)	44% (7)	44% (14)
No	56% (9)	56% (9)	56% (18)

TABLE ID-2

QD2: Has the lift bus service enabled you to travel to new places and to new activities?

Very much so	38% (6)	13% (2)	25% (8)
Somewhat	38% (6)	56% (9)	47% (15)
Not at all	25% (4)	31% (5)	28% (9)

TABLE ID-3, 4, 5A

Travel Characteristics Of Current Lift-Users

Trips Last Week

Survey I.D. #	# Trips in Motor Vehicles	# Trips by Metrorail	# Trips By Lift Bus For: Work/School	Shopping	Medical	Other	# Trips By Lift Bus Which: Would be Unable to Make Without Lift Bus	Involve Transfers To: Bus	Involve Transfers To: Rail
Round 1:									
74	>10	18	6-10	2-5	1	2-5	-	6-10	2-5
75	6-10	0	-	-	-	-	-	-	-
76	>10	0	0	0	0	0	-	-	-
77	0**	0	-	-	-	-	-	-	-
78	6-10	0	-	-	-	-	-	-	-
79	>10	7	-	-	-	-	-	-	-
80	3-5	0	0	0	0	0	-	-	-
81	>10	0	-	-	-	-	-	-	-
86	0+	0	-	-	-	-	-	-	-
100	6-10	3	-	2-5	2-5	-	-	-	-
101	>10	1	2-5	0	0	0	0	0	2-5
102	6-10	6	2-5	0	0	0	-	0	2-5
103	1-2	0	0	0	0	0	-	-	-
104	6-10	0	0	0	0	0	-	-	-
105	1-2	0	0	0	0	0	-	-	-
106	>10	16	6-10	0	0	2-5	0	0	6-10
107	6-10	2	0	0	0	0	-	-	-
108	6-10	0	0	0	0	2-5	2-5	0	2-5
109	6-10	0	0	0	0	0	-	-	-
110	1-2	0	0	0	0	0	-	-	-
111	6-10	10	0	0	0	0	-	-	-
112	6-10	0	-	-	-	-	-	-	-
92	6-10	0	-	-	-	-	-	-	-
54	>10	3	-	-	-	-	-	-	-
44	>10	0	-	-	-	-	-	-	-
43	>10	0	-	-	-	-	-	-	-
36	>10	0	-	-	-	-	-	-	-
34	>10	4	-	-	-	-	-	-	-

** 1-4 LAST MONTH

+ 0 LAST MONTH

NOTE: - INDICATES NO ANSWER OR NOT APPLICABLE

TABLE ID-3, 4, 5A (CONT'D)

Travel Characteristics Of Current Lift-Users

Round 2:

Survey I.D. #	# Trips in Motor Vehicles	# Trips by Metrorail	Trips Last Week: # Trips By Lift Bus For: Work/School	Shopping	Medical	Other	# Trips By Lift Bus Which: Would be Unable to Make Without Lift Bus	Involve Transfers for Bus	Involve Transfers To: Rail
121*	>10	2	0	0	0	1	0	0	0
127*	6-10	0	0	0	0	2-5	-	-	-
131	0+	0+	0	0	0	0	-	-	-
132	20	11	-	-	-	-	-	-	-
133	3 (?)	5	0	13	0	0	0	0	5
134	10	0	-	-	-	-	-	-	-
135	10	0	2	1	0	0	0	5	0
136	18	10	3	0	0	0	3	1	1
137	10	0	-	-	-	-	-	-	-
138	-	-	2	0	2	0	-	-	-
139	10	6	10	5	0	1	-	-	-
140	12	0	-	-	-	-	-	-	-
141	4	0	0	4	0	7	11	11	1
142	10	4	-	-	-	-	-	-	-
143	22	10	-	-	-	-	-	-	-
144	15	0	2	0	0	0	2	2	0
145	10	3	-	-	-	-	-	-	-
146	30	15	-	-	-	-	-	-	-
147	30	2	0	0	0	0	-	-	-
148	2	0	-	-	-	-	-	-	-
152	40	0	0	0	0	0	-	-	-
153	10	2	0	0	0	0	-	-	-
154	8	2	0	0	0	0	-	-	-
155	-	-	-	-	-	-	-	-	-

*FILLED OUT A ROUND 1 SURVEY FORM

+ 0 LAST MONTH

TABLE ID-3, 4, 5B

Travel Characteristics of Current Lift-Users Who Made No Lift-Bus Trips Last Week

Trips Last Month

Round 1: Survey I.D. #	# Trips in Motor Vehicles	# Trips by Metrorail	# Trips By Lift Bus For: Work/School	Shopping	Medical	Other	# Trips By Lift Bus Which: Would be Unable to Make Without Lift Bus	Involve Transfers To: Bus	Involve Transfers To: Rail
75	-	-	6-10	-	-	-	0	0	6-10
76	-	-	0	0	0	0	-	-	-
80	-	-	0	0	0	1	0	1	-
100	-	-	-	2-5	0	0	0	2-5	2-5
103	-	-	0	0	0	0	-	-	-
104	-	-	0	2-5	0	2-5	0	0	0
105	-	-	0	0	0	0	-	-	-
107	-	-	2-5	2-5	0	0	0	0	2-5
109	-	-	0	0	0	0	-	-	-
110	-	-	0	1	0	1	0	0	-

TABLE ID-3, 4, 5B (CONT'D)

Travel Characteristics of Current Lift-Users Who Made No Lift-Bus Trips Last Week

Trips Last Month

Round 2: Survey I.D. #	# Trips in Motor Vehicles	# Trips by Metrorail	# Trips By Lift Bus For: Work/School	Shopping	Medical	Other	# Trips By Lift Bus Which: Would be Unable to Make Without Lift Bus	Involve Transfers To: Bus	Involve Transfers To: Rail
131	0	0	0	0	0	0	-	-	-
147	-	-	2	0	0	0	0	0	2
152	-	-	8	0	2	0	10	0	0
153	-	-	60	10	2	0	72	6	6
154	-	-	10	4	0	3	0	0	1

TABLE ID-6

QD6: For your most frequent lift-bus trip:

	Round 1	Round 2	TOTAL
Previous Mode			
Drove	5	5	10
Was driven	5	6	11
Metrobus	3	2	5
Metrorail	1	1	2
Taxi	2	4	6
Bus/rail	2	-	2
Private wheelchair-van service	1	1	2
Human service agency	1	-	1
Didn't make the trip	-	1	1
One-way Fare (Before/After)			
20¢ or under	2 7	1 -	3 7
21¢-25¢	- 1	1 4	1 5
26¢-40¢	1 2	2 2	3 4
41¢-50¢	1 2	2 2	3 4
51¢-75¢	- 2	- 1	- 3
75¢-$1.00	- -	1 1	1 1
$1.01-$2.00	4 1	2 1	6 2
$2.01-$3.00	- -	- 2	- 2
over $3.00	1 1	- 1	1 2
Free	5 -	- -	5 -
Not applicable	- -	3 -	3 -
One-way Travel Time (Before/After)			
5 minutes	- -	2 1	2 1
10 minutes	- -	1 2	1 2
15/20 minutes	5 2	3 4	8 6
30 minutes	5 5	4 -	9 5
45 minutes	- 1	1 -	1 1
1 hour	1 2	- 2	1 4
1 1/4 hour	3 4	1 1	4 5
1 1/2 hours	- -	- 1	- 1
1 3/4 hours	1 1	1 -	2 1
2 hours or more	- -	- 1	- 1

TABLE ID-7

QD7: How do you usually get from your home to the bus stop where you catch the lift-bus?

	Round 1	Round 2	TOTAL
Walk/wheelchair	87% (13)	77% (10)	82% (13)
Drive automobile	-	8% (1)	4% (1)
Obtain ride from a member of household	7% (1)	8% (1)	7% (2)
Obtain ride from a friend	-	8% (1)	4% (1)
Other	7% (1)	-	4% (1)

TABLE ID-8

QD8: How far is it from your home to the bus stop where you catch the lift-bus?

	Round 1	Round 2	TOTAL
1 block	50% (8)	38% (5)	45% (13)
2 blocks	19% (3)	15% (2)	17% (5)
3 blocks	6% (1)	15% (2)	10% (3)
More than 4 blocks	25% (4)	30% (4)	28% (8)

TABLE ID-9

QD9: How long does it take you to get to this bus stop?

	Round 1	Round 2	TOTAL
0-5 minutes	53% (8)	36% (5)	46% (13)
6-10 minutes	20% (3)	43% (6)	32% (9)
11-15 minutes	13% (2)	7% (1)	11% (3)
16-20 minutes	-	7% (1)	4% (1)
21-25 minutes	-	-	-
26-30 minutes	7% (1)	-	4% (1)
More than 30 minutes	7% (1)	7% (1)	4% (1)

TABLE ID-10

QD10: Would you need personal assistance from an escort ... ?

	Round 1	Round 2	TOTAL
a. To get to the bus stop	25% (4)	7% (1)	16% (5)
b. To travel on the lift-equipped Metrobus	6% (1)	-	3% (1)
c. To travel on Metrorail	-	-	-
d. To travel by taxi	45% (5)	7% (1)	24% (6)
e. To travel by human service agency or private wheelchair-van transportation	50% (5)	-	13% (2)

TABLE IE-1

QE1: What problems have you had with the lift buses, and how serious have these problems been?

		Round 1			Round 2			TOTAL		
		Serious	Medium	No Problem	Serious	Medium	No Problem	Serious	Medium	No Problem
a.	Lack of convenient bus stops/routes	3	5	10	11	4	7	14	9	17
b.	Difficulty getting schedules	5	4	9	4	7	11	9	11	20
c.	Feeling safe getting to the bus stop	1	2	15	2	5	13	3	7	28
d.	Getting to the bus in bad weather	7	4	7	8	6	7	15	10	14
e.	Lack of bus shelters	8	7	4	8	7	6	16	14	10
f.	Lack of curb cuts	9	6	4	6	8	8	15	14	12
g.	Buses not arriving one time	6	6	6	7	8	6	13	14	12
h.	Buses not stopping at curb or accessible location	3	6	9	5	4	11	8	10	20
i.	Entry denied because lift inoperable	9	5	5	12	5	4	21	10	9
j.	Getting onto the lift platform	1	4	13	2	5	14	3	9	27
k.	Feeling secure on lift	0	3	15	2	4	15	2	7	30
l.	Driver assistance and courtesy not helpful	1	4	13	6	2	14	7	6	27
m.	Using the farebox	0	1	17	1	2	19	1	3	36
n.	Priority seating for handicapped/elderly not effective	2	1	14	5	4	13	7	5	27

TABLE IE-1 (continued)

	Round 1			Round 2			TOTAL		
	Serious	Medium	No Problem	Serious	Medium	No Problem	Serious	Medium	No Problem
o. Maneuvering to the wheelchair position	2	3	14	4	5	10	6	8	24
p. Crowds in the aisle	0	7	12	5	5	10	5	12	22
q. Bus driver moves the bus too soon, lose balance	1	1	16	4	6	10	5	7	26
r. Non-wheelchair passenger seated in wheelchair balance	2	1	16	4	5	12	6	6	28
s. Wheelchair location already occupied	1	0	18	0	4	16	1	4	34
t. Securing the wheelchair	0	3	16	2	6	11	2	9	27
u. Once in position fear of wheelchair rolling while bus is in motion	0	2	17	2	6	11	2	8	28
v. Bus ride is uncomfortable	1	2	16	1	3	17	2	5	33
w. Attitude of other passengers	2	2	15	1	4	16	3	6	31
x. Feeling safe in the bus	1	1	17	1	6	14	2	7	31
y. Fear of crime on the bus	1	1	17	1	5	14	2	6	31
z. Fear of inability to leave bus in an emergency	2	1	16	4	9	8	6	10	24
aa. Grab rails inadequate	N/A			4	3	10	4	3	10
bb. Other	N/A			3	0	3	3	0	3

TABLE IE-2

QE2: Are the following problems you have experienced in using Metrorail, and how much of a problem are they?

	Round 1			Round 2			TOTAL		
	Serious	Medium	No Problem	Serious	Medium	No Problem	Serious	Medium	No Problem
a. Elevators not reliable	7	5	3	6	11	2	13	16	5
b. Fear of accidents in Metrorail station/ vehicle	3	1	11	4	2	12	7	3	23
c. Fear of inability to get in/out of Metrorail station/vehicle	4	2	9	2	7	9	6	9	18
d. Fear of inability to leave Metrorail station/vehicle in an emergency	4	0	11	6	4	9	10	4	20
e. Fear of crime in Metrorail station/ vehicle	2	1	12	4	5	10	6	6	22

TABLE IE-3

QE3: Which of the following improvements do you feel would be necessary to enhance the lift-equipped service?

	Round 1			Round 2			TOTAL		
	Very Necessary	Somewhat Necessary	Not Important	Very Necessary	Somewhat Necessary	Not Important	Very Necessary	Somewhat Necessary	Not Important
a. Better design of lift	9	4	6	7	9	5	16	13	11
b. More help from drivers	1	6	12	5	8	7	6	14	19
c. Better design of interior of lift-buses	8	5	6	8	5	8	16	10	14
d. More curb cuts	13	2	4	11	9	11	24	11	15
e. More and better located bus stops	9	1	9	11	5	3	20	6	12
f. Greater public awareness	12	5	2	13	5	1	25	10	3

TABLE IE-4

QE4: What is your overall opinion of the quality of the fixed-route lift-bus service?

	Round 1	Round 2	TOTAL
Excellent	5% (1)	-	3% (1)
Very Good	16% (3)	14% (2)	20% (7)
Good	47% (9)	43% (6)	43% (15)
Fair	26% (5)	29% (4)	26% (9)
Poor	5% (1)	14% (2)	9% (3)

TABLE IE-5

QE5: Do you perceive that other passengers are annoyed by the delays which result from lift operation?

	Round 1	Round 2	TOTAL
Yes, quite a few	35% (7)	28% (5)	32% (12)
Very few	40% (8)	39% (7)	39% (15)
No	25% (5)	28% (5)	26% (10)
Not sure	-	6% (1)	3% (1)

TABLE IE-6

QE6: Would you prefer a door-to-door service?

	Round 1	Round 2	TOTAL
Yes	35% (7)	29% (5)	32% (12)
No	60% (12)	65% (11)	62% (23)
Not sure	5% (1)	6% (1)	5% (2)

TABLE IF-1

QF1: Do other people live in your household?

	Round 1	Round 2	TOTAL
No, live alone	36% (10)	48% (11)	41% (21)
Yes, family	54% (15)	43% (10)	49% (25)
Yes, others	11% (3)	9% (2)	10% (5)

TABLE IF-2A

QF2A: Which employment category best describes you?

	Round 1	Round 2	TOTAL
Full-time worker	58% (15)	50% (11)	54% (26)
Part-time worker	-	9% (2)	4% (2)
Home-based employee	4% (1)	-	2% (1)
Unemployed, looking for work	-	5% (1)	2% (1)
Full-time rehabilitation	-	5% (1)	2% (1)
Sheltered employment	-	-	-
Student	8% (2)	18% (4)	13% (6)
Homemaker	-	-	-
Retired	12% (3)	9% (2)	10% (5)
Unemployed and on disability/public assistance/social security	15% (4)	-	8% (4)
Other	4% (1)	5% (1)	4% (2)

TABLE IF-2B

QF2B: If unemployed, does lift-bus service increase your chances of getting a job?

	Round 1	Round 2	TOTAL
Yes	-	100% (1)	25% (1)
No, transportation is not the major problem	33% (1)	-	25% (1)
No, lift-bus service does not meet my transportation needs.	67% (2)	-	50% (2)

TABLE IF-3

QF3: What is your age?

Age	Round 1	Round 2	TOTAL
10-14	-	-	-
15-19	-	13% (3)	6% (3)
20-24	8% (2)	4% (1)	6% (3)
25-34	28% (7)	44% (10)	35% (17)
35-44	16% (4)	22% (5)	19% (9)
45-54	24% (6)	4% (1)	15% (7)
55-59	24% (6)	4% (1)	15% (7)
60-64	-	4% (1)	2% (1)
65 and over	-	4% (1)	2% (1)

TABLE IF-4

QF4: Are you . . . . ?

	Round 1	Round 2	TOTAL
Male	68% (19)	59% (13)	64% (32)
Female	32% (9)	41% (9)	36% (18)

TABLE IF-5

QF5: What is your gross annual household income?

Income	Round 1	Round 2	TOTAL
Under $5,000	25% (5)	16% (3)	21% (8)
$ 5,000-$ 9,999	15% (3)	16% (3)	15% (6)
$10,000-$14,999	10% (2)	5% (1)	8% (3)
$15,000-$19,999	5% (1)	16% (3)	10% (4)
$20,000-$24,999	-	16% (3)	8% (3)
$25,000-$29,999	15% (3)	11% (2)	13% (5)
$30,000 or over	30% (6)	21% (4)	26% (10)

TABLE IF-6

QF6: Where do you reside?

	Round 1	Round 2	TOTAL
N.E. D.C.	7% (2)	-	4% (2)
S.E. D.C.	4% (1)	9% (2)	6% (3)
N.W. D.C.	21% (6)	9% (2)	16% (8)
S.W. D.C.	7% (2)	13% (3)	10% (5)
Fairfax County, Virginia	-	9% (2)	4% (2)
Arlington County, Virginia	7% (2)	-	4% (2)
Alexandria, Virgina	11% (3)	9% (2)	10% (5)
Prince George's County, Maryland	18% (5)	-	10% (5)
Montgomery County, Maryland	18% (5)	48% (11)	31% (16)
Other	7% (2)	4% (1)	6% (3)

TABLE IX-1

Mode Alternatives
All Lift-Users

	Available	Physically Able to Use
Drive auto/van	55%	71%
Ride with household member	27%	47%
Ride with friend	35%	61%
Human service agency transportation	2%	31%
Taxi	45%	71%
Private wheelchair van	4%	33%
Metrorail	49%	69%
Other	8%	10%

TABLE IX-2

Mode Alternatives

	Wheelchair Users		Non-Wheelchair Users	
	Available	Physically Able to Use	Available	Physically Able to Use
Drive auto/van	55%	70%	55%	70%
Ride with household member	21%	41%	55%	70%
Ride with friend	32%	59%	44%	60%
Human service agency transportation	3%	32%	-	30%
Taxi	47%	70%	44%	70%
Private wheelchair van	5%	41%	-	20%
Metrorail	55%	76%	22%	40%
Other	11%	11%	-	-

TABLE IX-3

Transportation handicaps/Functional impairments of Wheelchair and Non-Wheelchair Lift-Users

Type of handicap	Wheelchair lift users	Non-Wheelchair lift users
Difficulty walking (to a bus stop)	78% (25)	40% (4)
Difficulty climbing stairs	91% (29)	80% (8)
Difficulty maneuvering through crowds	53% (17)	60% (6)
Difficulty waiting outside for buses	38% (12)	40% (4)
Difficulty standing in moving vehicles	78% (25)	90% (9)
Difficulty maintaining balance while bus stops and starts	53% (17)	70% (7)
Unable to reach or hold grips	25% (8)	10% (1)
Communication difficulty	13% (4)	10% (1)
Visual difficulty	6% (2)	10% (1)
Difficulty in understanding the system	13% (4)	-
TOTAL RESPONDENTS	32	10
Responses per individual	4.5	4.1

APPENDIX B-II: RESULTS OF THE NON-USER SURVEY

SURVEY OF TRANSPORTATION HANDICAPPED NON-USERS IN THE WASHINGTON METROPOLITAN AREA

Good Day!

This survey is being conducted by the George Washington University in cooperation with the Federal Department of Transportation. As you may know, WMATA has specially equipped many of its Metrobuses with lifts at the front door so that wheelchair users and other passengers who have difficulty climbing stairs can use the Metrobus service. (When we refer to regular Metrobuses we mean those without the special lifts. Metrobus, is a fixed-route service, that is, the buses travel on designated routes and do not make special detours to pick up passengers off the route.)

The federal government will use the results of this survey to evaluate how successful the lift-equipped buses are in providing transportation to disabled residents of the Washington metropolitan area.

Please help us improve transportation for everyone by taking some time to complete this survey. Your cooperation is very much appreciated.

1. Are you able to travel by regular Metrobuses (not lift-equipped)?

   (1) Yes

   (2) No

2. If you were to use Metrobus and you knew the bus was lift-equipped, would you use the lift?

   (1) Yes

   (2) No, why not? _____

   _____

3. Have you ever used the lift on Metrobus?

   (1) Yes

   (2) No

   If you answered YES to QUESTION 3, please stop here and request a USER SURVEY.

A. INFORMATION ABOUT DISABILITY AND/OR HANDICAP

1. Disability: (please check all that apply)

(1) Cerebral palsy
(2) Muscular dystrophy
(3) Multiple sclerosis
(4) Arthritis
(5) Epilepsy
(6) Amputee
(7) Temporary injury
(8) Mental retardation
(9) Blindness/visual impairment
(10) Spinal cord injury
(11) Paraplegic
(12) Quadriplegic
(13) Hemaplegic
(14) Polio
(15) Spina bifida
(16) Orthopedic (bone & joint) impairment
(17) Stroke
(18) Deafness/hearing impairment
(19) Heart/lung impairment
(20) Other _____
(specify)

2. Transportation handicap/Functional impairment: (please check all that apply)

(1) Difficulty climbing stairs
(2) Difficulty maneuvering through crowds
(3) Difficulty waiting outside for buses
(4) Difficulty standing in moving vehicles
(5) Difficulty maintaining balance while bus stops and starts
(6) Unable to reach or hold grips
(7) Difficulty walking
(8) Communication difficulty
(9) Visual difficulty
(10) Difficulty in understanding the system

3. What aids do you use when travelling outside of the house?

(1) Wheelchair

(2) Walker
(3) Crutches
(4) Walking cane
(5) Braces
(6) Artificial limb
(7) Guide dog
(8) White cane
(9) Other _____ (specify)
(10) None

} Skip to Section B, page 4

For Wheelchair Users (only):

4. Do you always use a wheelchair when outside of the house?

(1) Yes
(2) No

5. Are there curb cuts in the vicinity of your residence?

(1) Yes
(2) No
(3) No curbs

6. What type of wheelchair do you use?

(1) Manual - narrow
(2) Manual - standard
(3) Manual - wide
(4) Manual - junior custom
(5) Power drive - conventional model
(6) Power drive - Amigo
(7) Power drive - Abec
(8) Power drive - other
(9) Both power and manual

B. TRANSPORTATION

1. Do you (or does someone in your household) own a car?

   (1) Yes

   (2) No

2. Other than regular lift-equipped Metrobus service, what means of travel are frequently available to you? (check all that apply)

   (1) Drive automobile/van

   (2) Obtain a ride from a member of my household

   (3) Obtain a ride from a friend

   (4) Human (social) service agency transportation

   (5) Taxi

   (6) Private wheelchair-van service

   (7) Metrorail (subway)

   (8) Other _____
   (specify)

3. If each of the following were available, which would you be physically able to use? (check all that apply)

   (1) Drive automobile/van

   (2) Obtain a ride from a member of my household

   (3) Obtain a ride from a friend

   (4) Human (social) service agency transportation

   (5) Taxi

   (6) Private wheelchair-van service

   (7) Metrorail (subway)

   (8) Other _____
   (specify)

4. How do you usually travel for:

a. Work/school trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(9) Private wheelchair-van service

(10) Other _____
(specify)

b. Shopping trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(9) Private wheelchair-van service

(10) Other _____
(specify)

c. Medical trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(9) Private wheelchair-van service

(10) Other_____
(specify)

d. Social/Recreational trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(9) Private wheelchair-van service

(10) Other _____
(specify)

e. Personal business trips

(1) Drive automobile/van

(2) Obtain a ride from a member of my household

(3) Obtain a ride from a friend

(4) Human (social) service agency transportation

(5) Taxi

(6) Metrobus

(7) Metrorail (subway)

(8) Metrobus transferring to/from Metrorail

(9) Private wheelchair-van service

(10) Other _____
(specify)

5. Please indicate below how many trips you made in motor vehicles (of any type). (Count each one-way trip as a trip, each round trip as two trips)

_____ _____ last week

If NONE last week, how many last month?

_____ _____ last month

6. How many of these trips were by Metrorail?

_____ _____

7. Were you aware of the lift-equipped Metrobus service?

(1) Yes

(2) No - - - (Skip to Question 10, page 8)

8. How did you learn about the specially equipped buses? (check all that apply)

(1) Radio
(2) TV
(3) Newspaper/magazine
(4) Witnessed lift bus demonstration
(5) Human (social) service agency
(6) Word of mouth
(7) Saw lift bus on street
(8) Health care worker/therapist/counselor
(9) Other _____
(specify)

9.a. Did you participate in a demonstration or receive training in how to use the lift-equipped bus?

(1) Yes
(2) No

b. Whom did you receive training from?

(1) Human (social) service agency
(2) Rehabilitation professional (therapist, nurse, counselor)
(3) WMATA (drove a bus into neighborhood)
(4) Other _____
(specify)

10. How far would you be able to travel to a bus stop

a. In good weather?

(1) 0 blocks
(2) 1 block
(3) 2 blocks
(4) 3 blocks
(5) 4 blocks
(6) more than 4 blocks

b. In rainy or snowy weather?

(1) 0 blocks

(2) 1 block

(3) 2 blocks

(4) 3 blocks

(5) 4 blocks

(6) more than 4 blocks

11.a. Is there a Metrorail stop convenient to your home?

(1) Yes

(2) No

(3) Not sure

b. Is there a bus stop convenient to your home?

(1) Yes

(2) No

Skip to 12

(3) Not sure

If Yes, can you catch a lift bus at this stop?

(1) Yes

(2) No

Skip to 12

(3) Not sure

If Yes, would this lift bus take you to a Metrorail station?

(1) Yes

(2) No

Skip to 12

(3) Not sure

12. Assuming that a bus stop is located within an accessible distance of your home, do you think lift-equipped metrobus would be a convenient means of travel for:

a. Work/school trips?

(1) Yes

(2) Sometimes

(3) No

(4) Not sure

b. Shopping trips?

(1) Yes

(2) Sometimes

(3) No

(4) Not sure

c. Medical trips?

(1) Yes

(2) Sometimes

(3) No

(4) Not sure

d. Other

(1) Yes

(2) Sometimes

(3) No

(4) Not sure

C. REASONS FOR NON-USE

1. What are the main reasons you have never tried the lift bus service?

(1) Have not been aware of the service

(2) Bus doesn't go where I want to go

(3) Schedules are not convenient

(4) I can't go out of the house without help

(5) Bus stop is not convenient to my home

(6) I am physically unable to get to the bus stop

(7) Fear of traffic

(8) Fear of not being able to get into or maneuver within the vehicle

(9) Don't like crowds

(10) Fear of embarrassment

(11) Transferring would take too long

(12) Transferring would be physically difficult for me

(13) I have a car that I can drive

(14) I get a ride when I need to go somewhere

(15) I prefer to use taxis

(16) I prefer to use private wheelchair-van transportation

(17) I prefer to use human (social) service agency transportation

(18) I don't travel

(19) Other _____
(Specify)

2. Do you think you are physically able to use the lift-equipped Metrobus?

(1) Yes

(2) No

(3) Not sure

3. Would you need personal assistance from an escort:

a. To travel on Metrorail?

(1) Yes _____
(explain)

_____

(2) No

b. To travel by taxi?

(1) Yes _____
(explain)

_____

(2) No

c. To travel by lift-equipped Metrobus?

(1) Yes _____
(explain)

_____

(2) No

D. GENERAL CHARACTERISTICS

1. Do other people live in your household?

(1) No, live alone
(2) Yes, family
(3) Yes, others

2.a. Which category best describes you?

(1) Full-time worker
(2) Part-time worker
(3) Home-based employee
(4) Unemployed, looking for work
(5) Full-time rehabilitation
(6) Sheltered employment
(7) Student
(8) Homemaker
(9) Retired
(10) Unemployed and on disability/public assistance/social security
(11) Other _____
(specify)

b. If unemployed, does lift-bus service increase your chances of getting a job?

(1) Yes
(2) No, transportation is not the major problem
(3) No, lift-bus service does not meet my transportation needs.

3. What is your age?

(1) 10-14
(2) 15-19
(3) 20-24
(4) 25-34
(5) 35-44
(6) 45-54
(7) 55-59
(8) 60-64
(9) 65 or over

4. Are you....?

(1) Male

(2) Female

5. What is your gross annual household income? (This information is for statistical purposes only; if you do not wish to answer, please go on to the next question.)

(1) Under $5,000

(2) $ 5,000 - $ 9,999

(3) $10,000 - $14,999

(4) $15,000 - $19,999

(5) $20,000 - $24,999

(6) $25,000 - $29,999

(7) $30,000 or over

6. Where do you reside?

(1) N.E. D.C.

(2) S.E. D.C.

(3) N.W. D.C.

(4) S.W. D.C.

(5) Fairfax County, Virginia

(6) Arlington County, Virginia

(7) Alexandria, Virginia

(8) Prince George's County, Maryland

(9) Montgomery County, Maryland

(10) Other _____
(specify)

We welcome any other comments you may have concerning this new accessible service. Your time and assistance is most appreciated.

TABLE II-1

Q1: Are you able to travel by regular Metrobuses (not lift-equipped)?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Can use regular Metrobus	7% (2)	5% (3)	74% (14)	60% (36)	34% (55)
Cannot use regular Metrobus	93% (26)	95% (52)	26% (5)	40% (24)	66% (107)

TABLE II-2

Q2: If you were to use Metrobus and you knew the bus was lift-equipped, would you use the lift?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Would use the lift	86% (25)	96% (53)	100% (19)	100% (61)	96% (158)
Would not use the lift	15% (4)	4% (2)	-	-	4% (6)

TABLE II-3

Q3: Have you ever used the lift on a Metrobus?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Have tried the lift	-	9% (5)	-	8% (5)	6% (10)
Have not tried the lift	100% (27)	91% (50)	100% (19)	92% (55)	94% (151)
Missing	(4)	(2)	(0)	(0)	(6)

TABLE IIA-1

QA1: Disabilities

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Type of disability	Round 1	Round 2	Round 1	Round 2	TOTAL
Cerebral palsy	3% (1)	20% (11)	5% (1)	2% (1)	9% (14)
Muscular dystrophy	-	4% (2)	5% (1)	2% (1)	2% (4)
Multiple sclerosis	19% (6)	7% (4)	16% (3)	2% (1)	9% (14)
Arthritis	3% (1)	4% (2)	21% (4)	44% (25)	20% (32)
Epilepsy	-	-	5% (1)	-	1% (1)
Amputee	23% (7)	5% (3)	5% (1)	4% (2)	8% (13)
Temporary injury	-	2% (1)	-	-	1% (1)
Mental retardation	-	-	-	4% (2)	1% (2)
Blindness/visual impairment	7% (2)	4% (2)	5% (1)	4% (2)	4% (7)
Spinal cord injury	29% (9)	21% (12)	16% (3)	-	15% (24)
Paraplegic	29% (9)	26% (15)	11% (2)	2% (1)	16% (27)
Quadriplegic	13% (4)	16% (9)	-	-	8% (13)
Hemaplegic	-	4% (2)	-	7% (4)	4% (6)
Polio	10% (3)	5% (3)	-	7% (4)	6% (10)
Spina bifida	-	2% (1)	-	2% (1)	1% (2)
Orthopedic impairment	13% (4)	12% (7)	26% (5)	28% (16)	20% (32)
Stroke	7% (2)	4% (2)	-	9% (5)	5% (9)
Deafness/hearing impairment	3% (1)	2% (1)	5% (1)	4% (2)	3% (5)
Heart/lung impairment	-	-	-	5% (3)	2% (3)
Other	10% (3)	11% (6)	11% (2)	14% (8)	12% (19)
TOTAL RESPONDENTS	31	57	19	57	164
Responses per individual	1.7	1.5	1.3	1.4	1.5

TABLE IIA-2

QA2: Transportation handicaps/Functional impairments

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Type of handicap	Round 1	Round 2	Round 1	Round 2	TOTAL
Difficulty getting/ walking (to a bus stop)	79% (22)	92% (47)	61% (11)	69% (40)	77% (120)
Difficulty climbing stairs	96% (27)	94% (48)	61% (11)	83% (48)	86% (134)
Difficulty maneuvering through crowds	71% (20)	75% (38)	56% (10)	55% (32)	65% (100)
Difficulty waiting outside for buses	61% (17)	57% (29)	39% (7)	50% (29)	53% (82)
Difficulty standing in moving vehicles	79% (22)	82% (42)	78% (14)	71% (41)	77% (119)
Difficulty maintaining balance while bus stops and starts	68% (19)	67% (34)	72% (13)	71% (41)	69% (107)
Unable to reach or hold grips	43% (12)	43% (22)	22% (4)	29% (17)	35% (55)
Communication difficulty	4% (1)	10% (5)	11% (2)	14% (8)	10% (16)
Visual difficulty	11% (3)	14% (7)	11% (2)	10% (6)	12% (18)
Difficulty in understanding the system	11% (3)	14% (7)	-	16% (9)	12% (19)
TOTAL RESPONDENTS	28	51	18	58	155
Responses per individual	5.2	5.5	4.1	4.7	5.0

TABLE IIA-3

Use of Aids

QA3: What aids do you use when travelling outside of the house?

	Wheelchair-confined non-users		Non-wheelchair-non-users who would use the lift		
Type of Aid	Round 1	Round 2	Round 1	Round 2	TOTAL
Wheelchair	100% (31)	100% (57)	- -	- -	61% (88)
Walker	10% (3)	2% (1)	7% (1)	2% (1)	4% (6)
Crutches	23% (7)	14% (8)	40% (6)	15% (6)	19% (27)
Walking cane	10% (3)	2% (1)	40% (6)	49% (20)	21% (30)
Braces	13% (4)	4% (2)	20% (3)	15% (6)	10% (15)
Artifical limb	13% (4)	2% (1)	7% (1)	2% (1)	5% (7)
Guide dog	-	-	7% (1)	2% (1)	1% (2)
White cane	-	-	7% (1)	% (3)	3% (4)
Other	-	-	13% (2)	7% (1)	2% (3)
None	N/A	-	N/A	20% (8)	N/A (8)
TOTAL RESPONDENTS	31	57	15	41	144
Responses per individual	1.7	1.2	1.4	1.1	1.3

TABLE IIA-4

QA4: Do you always use a wheelchair when outside of the house?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Yes	71% (22)	93% (53)	-	-	85% (75)
No	29% (9)	7% (4)	-	-	15% (13)

TABLE IIA-5

QA5: Are there curb cuts in the vicinity of your residence?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2*	TOTAL
Curb cuts	45% (14)	39% (22)	-	60% (25)	47% (61)
No curb cuts	39% (12)	55% (31)	-	36% (15)	45% (58)
No curbs	16% (5)	5% (3)	-	5% (2)	8% (10)

* Percentages have been adjusted. Persons not in wheelchairs should not have answered this question; however, two-thirds of this group did respond.

TABLE IIA-6

QA6: What type of wheelchair do you use?

Wheelchair non-users

Type of Wheelchair	Round 1	Round 2	TOTAL
Manual - narrow	23% (13)	19% (6)	22% (19)
Manual - standard	51% (29)	52% (16)	51% (45)
Manual - wide	2% (1)	3% (1)	2% (2)
Manual - junior custom	2% (1)	3% (1)	2% (2)
Power drive - conventional model	7% (4)	-	5% (2)
Power drive - Amigo	5% (3)	3% (1)	5% (4)
Power drive - Abec	2% (1)	3% (1)	2% (2)
Power drive - other	4% (2)	3% (1)	3% (3)
Both power and manual	5% (3)	13% (4)	8% (7)

TABLE IIB-1

QB1: Do you (or does someone in your household) own a car?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Car in household	90% (27)	81% (46)	84% (16)	54% (32)	73% (121)
No car in household	10% (3)	19% (11)	16% (3)	46% (27)	27% (44)

TABLE IIB-2

QB2: Other than regular lift-equipped Metrobus service, what <u>means of travel are frequently available</u> to you? (Check all that apply.)

	Wheelchair non-users		Non-wheelchair-non-users who would use the lift		
Travel mode	Round 1	Round 2	Round 1	Round 2	TOTAL
Drive auto/van	60% (18)	42% (24)	68% (13)	25% (15)	42% (70)
Ride with household member	53% (16)	67% (38)	68% (13)	33% (20)	52% (87)
Ride with friend	47% (14)	58% (33)	63% (12)	48% (29)	53% (88)
Human service agency transportation	13% (4)	19% (11)	11% (2)	40% (24)	25% (41)
Taxi	37% (11)	28% (16)	58% (11)	52% (31)	42% (69)
Private wheelchair van	17% (5)	7% (4)	-	3% (2)	7% (11)
Metrorail	13% (4)	21% (12)	26% (5)	18% (11)	19% (32)
Other	-	2% (3)	16% (3)	2% (1)	4% (7)
TOTAL RESPONDENTS	30	57	19	60	166
Responses per individual	2.4	2.5	3.1	2.2	2.4

TABLE IIB-3

QB3: If each of the following were available, which would you be physically able to use? (Check all that apply.)

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Travel mode	Round 1	Round 2	Round 1	Round 2	TOTAL
Drive auto/van	70% (21)	55% (31)	74% (14)	26% (15)	50% (81)
Ride with household member	67% (20)	77% (43)	84% (16)	54% (31)	68% (110)
Ride with friend	67% (20)	75% (42)	74% (14)	60% (34)	68% (110)
Human service agency transportation	50% (15)	46% (26)	63% (12)	60% (34)	54% (87)
Taxi	60% (18)	45% (25)	68% (13)	77% (44)	62% (100)
Private wheelchair van	67% (20)	45% (25)	26% (5)	5% (3)	33% (53)
Metrorail	60% (18)	54% (30)	63% (12)	47% (27)	54% (87)
Other	-	7% (4)	16% (3)	-	4% (7)
TOTAL RESPONDENTS	30	56	19	57	162
Responses per individual	4.4	4.0	4.7	4.0	3.9

TABLE IIB-4A

QB4A: How do you usually travel for work/school trips?

	Wheelchair non-users		Non-wheelchair-non-users who would use the lift		
Travel Mode	Round 1	Round 2	Round 1	Round 2	TOTAL
Drive	62% (16)	41% (19)	61% (11)	37% (10)	48% (56)
Ride with household member	39% (10)	30% (14)	22% (4)	19% (5)	28% (33)
Ride with friend	12% (3)	22% (10)	11% (2)	22% (6)	18% (21)
Human service agency transportation	12% (3)	15% (7)	6% (1)	11% (3)	12% (14)
Taxi	23% (6)	13% (6)	6% (1)	19% (5)	15% (18)
Private wheelchair van	8% (1)	7% (3)	-	-	3% (4)
Metrobus	4% (2)	-	11% (2)	22% (6)	9% (10)
Metrorail	8% (2)	7% (3)	17% (3)	11% (3)	9% (11)
Metrobus to Metrorail	8% (2)	-	6% (1)	4% (1)	3% (4)
Other	-	26% (12)	17% (3)	7% (2)	15% (17)
TOTAL RESPONDENTS	26	46	18	27	117
Responses per individual	1.7	1.6	1.6	1.5	1.6

TABLE IIB-4B

QB4B: How do you usually travel for shopping trips?

	Wheelchair non-users		Non-wheelchair-non-users who would use the lift		
Travel mode	Round 1	Round 2	Round 1	Round 2	TOTAL
Drive	55% (16)	41% (22)	63% (12)	26% (15)	41% (65)
Ride with household member	52% (15)	48% (26)	47% (9)	19% (11)	38% (61)
Ride with friend	24% (7)	46% (25)	21% (4)	26% (15)	32% (51)
Human service agency transportation	3% (1)	7% (4)	-	28% (16)	13% (21)
Taxi	14% (4)	15% (8)	5% (1)	24% (14)	17% (27)
Private wheelchair van	3% (1)	2% (1)	-	-	1% (2)
Metrobus	3% (1)	2% (1)	16% (3)	12% (7)	8% (12)
Metrorail	14% (4)	2% (1)	11% (2)	7% (4)	7% (11)
Metrobus to Metrorail	3% (1)	-	-	3% (2)	2% (3)
Other	-	2% (1)	16% (3)	5% (3)	4% (7)
TOTAL RESPONDENTS	29	54	19	58	160
Responses per individual	1.7	1.6	1.8	1.5	1.6

TABLE IIB-4C

QB4C: How do you usually travel for medical trips?

	Wheelchair non-users		Non-wheelchair-non-users who would use the lift		
Travel mode	Round 1	Round 2	Round 1	Round 2	TOTAL
Drive	55% (16)	39% (22)	63% (12)	23% (14)	39% (64)
Ride with household member	45% (13)	54% (31)	37% (7)	21% (13)	39% (64)
Ride with friend	21% (6)	30% (17)	21% (4)	20% (12)	23% (39)
Human service agency transportation	3% (1)	12% (7)	11% (2)	21% (13)	14% (23)
Taxi	14% (4)	16% (9)	11% (2)	23% (14)	17% (29)
Private wheelchair van	14% (4)	5% (3)	-	-	4% (7)
Metrobus	3% (1)	2% (1)	11% (2)	18% (11)	9% (15)
Metrorail	7% (2)	2% (1)	5% (1)	2% (1)	3% (5)
Metrobus to Metrorail	3% (1)	-	-	2% (1)	1% (2)
Other	-	4% (2)	11% (2)	2% (1)	3% (5)
TOTAL RESPONDENTS	29	57	19	61	166
Responses per individual	1.7	1.6	1.7	1.3	1.5

TABLE IIB-4D

QB4D: How do you usually travel for social/recreational trips?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Travel mode	Round 1	Round 2	Round 1	Round 2	TOTAL
Drive	55% (16)	44% (24)	67% (12)	24% (14)	41% (66)
Ride with household member	52% (15)	58% (32)	44% (8)	24% (14)	43% (69)
Ride with friend	31% (9)	40% (22)	22% (4)	31% (18)	33% (53)
Human service agency transportation	-	11% (6)	-	32% (19)	16% (25)
Taxi	14% (4)	15% (8)	17% (3)	24% (14)	18% (29)
Private wheelchair van	7% (2)	4% (2)	-	-	2% (4)
Metrobus	3% (1)	-	17% (3)	20% (12)	10% (16)
Metrorail	7% (2)	4% (2)	11% (2)	9% (5)	7% (11)
Metrobus to Metrorail	3% (1)	-	6% (1)	3% (2)	2% (4)
Other	3% (1)	6% (3)	11% (2)	2% (1)	4% (7)
TOTAL RESPONDENTS	29	55	18	59	161
Responses per individual	1.8	1.7	1.9	1.7	1.8

TABLE IIB-4E

QB4E: How do you <u>usually</u> travel for personal business trips?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Travel mode	Round 1	Round 2	Round 1	Round 2	TOTAL
Drive	55% (16)	43% (22)	63% (12)	27% (15)	42% (65)
Ride with household member	41% (12)	47% (24)	37% (7)	22% (12)	36% (55)
Ride with friend	24% (7)	41% (21)	21% (4)	24% (13)	29% (45)
Human service agency transportation	-	8% (4)	-	24% (13)	11% (17)
Taxi	14% (4)	18% (9)	11% (2)	31% (17)	21% (32)
Private wheelchair van	-	2% (1)	-	-	1% (1)
Metrobus	3% (1)	-	16% (3)	16% (9)	8% (13)
Metrorail	14% (4)	6% (3)	16% (3)	9% (5)	10% (15)
Metrobus to Metrorail	3% (1)	-	11% (2)	2% (1)	3% (4)
Other	3% (1)	4% (2)	16% (3)	4% (2)	5% (8)
TOTAL RESPONDENTS	29	51	19	55	154
Responses per individual	1.6	1.7	1.9	1.6	1.7

TABLE IIB-5

QB5: During the last week, about how many (one-way) trips have you made in motor vehicles (of any type)?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		All non-users
Number of trips	Round 1	Round 2	Round 1	Round 2	Round 2
None	3% (1)	11% (6)	11% (2)	7% (4)	8% (13)
1-2	10% (3)	9% (5)	16% (3)	16% (10)	13% (21)
3-5	14% (4)	7% (4)	5% (1)	33% (20)	17% (29)
6-10	17% (5)	25% (14)	5% (1)	25% (15)	21% (35)
More than 10	55% (16)	49% (28)	63% (12)	20% (12)	41% (68)
Trips per person per week	N/A	10.4	N/A	7.1	8.5
Standard deviation	N/A	7.2	N/A	6.2	6.7
Range	N/A	0-30	N/A	0-30	0-30
Median	N/A	10	N/A	5	10
Mode	N/A	10	N/A	5	10

* Round 2 users were asked an open ended question; for the purpose of this table their answers have been condensed into the categories used in the Round 1 survey.

TABLE IIB-6

QB6: Trips by Metrorail last week or last month?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Travel mode	Round 1	Round 2	Round 1	Round 2	TOTAL
Yes	14% (4)	4% (2)	22% (4)	8% (5)	9% (15)
No	86% (24)	96% (54)	78% (14)	92% (56)	91% (148)

TABLE IIB-7

QB7: Were you aware of the lift-equipped Metrobus service?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Aware of lift-bus service	77% (23)	93% (49)	79% (15)	60% (36)	76% (123)
Not aware of lift-bus service	23% (7)	7% (4)	21% (4)	40% (24)	24% (39)

TABLE IIB-8

QB8: How did you learn about the specially equipped buses?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Source	Round 1	Round 2	Round 1	Round 2	TOTAL
Television	42% (11)	48% (24)	69% (11)	40% (18)	47% (64)
Newspaper/ magazine	39% (10)	40% (20)	50% (8)	40% (18)	41% (56)
Word of mouth	39% (10)	28% (14)	44% (7)	20% (9)	29% (40)
Saw bus on street	23% (6)	16% (8)	19% (3)	9% (4)	15% (21)
Saw WMATA demonstration	19% (5)	26% (13)	19% (3)	18% (8)	21% (29)
Worker/therapist/ counselor	12% (3)	2% (1)	13% (2)	7% (3)	7% (9)
Radio	8% (2)	24% (12)	38% (6)	16% (7)	20% (27)
Human service agency	4% (1)	6% (3)	13% (2)	11% (5)	8% (11)
Other	4% (1)	12% (3)	13% (2)	11% (5)	10% (14)
TOTAL RESPONDENTS	26	50	16	45	137
Responses per individual	1.9	2.0	2.8	1.7	2.0

TABLE IIB-9A

QB9A: Did you participate in a demonstration or receive training in how to use the lift-equipped bus?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Participated in a demonstration or received training	11% (3)	37% (18)	6% (1)	19% (10)	22% (32)
No participation or training	89% (24)	63% (31)	94% (15)	81% (42)	78% (112)

TABLE IIB-9B

QB9B: Whom did you receive training from?[1]

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Source	Round 1	Round 2	Round 1	Round 2	TOTAL
Human service agency	-	-	-	3% (2)	1% (2)
Rehabilitation professional (therapist, nurse, counselor)	-	5% (3)	-	3% (2)	3% (5)
WMATA neighborhood demonstration	10% (3)	23% (13)	5% (1)	5% (3)	12% (20)
Other	-	6% (1)	-	2% (1)	1% (2)

[1] Percentages are based on all non-users, not just those receiving training.

TABLE IIB-10

QB10: Distance Willing to Travel to a Bus Stop

Distance	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
QB10A: How far would you be able to travel to a bus stop in good weather?					
0 blocks	14% (4)	18% (10)	-	12% (7)	13% (21)
1 blocks	39% (11)	24% (13)	33% (6)	37% (22)	32% (52)
2 blocks	18% (5)	20% (11)	17% (3)	27% (16)	22% (35)
3 blocks	11% (3)	7% (4)	22% (4)	8% (5)	10% (16)
4 blocks	4% (1)	13% (7)	6% (1)	10% (6)	9% (15)
Over 4 blocks	14% (4)	18% (10)	22% (4)	7% (4)	14% (22)
QB10B: How far would you be able to travel to a bus stop in rainy or snowy weather?					
0 blocks	50% (14)	58% (30)	47% (8)	54% (32)	54% (84)
1 blocks	36% (10)	24% (13)	29% (5)	17% (10)	24% (38)
2 blocks	-	11% (6)	12% (2)	17% (10)	11% (18)
3 blocks	4% (1)	4% (2)	-	7% (4)	4% (7)
4 blocks	4% (1)	-	-	-	1% (1)
Over 4 blocks	7% (2)	4% (2)	12% (2)	5% (3)	6% (9)

TABLE IIB-11

QB-11: Convenience of Bus and Rail Stops

	Wheelchair non-users						Non-wheelchair non-users who would use the lift						TOTAL		
	Round 1			Round 2			Round 1			Round 2					
	Yes	No	Not sure	Yes	No	Not sure	Yes	No	Not sure	Yes	No	Not sure	Yes	No	Not sure
Convenient bus stop near home	63% (19)	33% (10)	3% (1)	55% (31)	30% (17)	14% (8)	71% (5)	29% (45)	- (11)	79% (45)	19% (11)	2% (1)	67% (107)	27% (43)	6% (10)
Convenient lift bus stop near home	19% (4)	24% (5)	57% (12)	15% (6)	49% (19)	36% (14)	17% (2)	42% (5)	42% (5)	15% (6)	74% (29)	10% (4)	16% (18)	52% (58)	32% (35)
Convenient rail stop near home	22% (6)	67% (18)	11% (3)	22% (12)	71% (39)	7% (64)	44% (8)	50% (9)	6% (1)	32% (19)	67% (40)	2% (1)	28% (45)	66% (100)	6% (9)

TABLE IIB-12

QB-12: Convenience of Lift Bus Service

	Wheelchair non-users								Non-wheelchair non-users who would use the lift								TOTAL			
	Round 1				Round 2				Round 1				Round 2							
	Yes	Some-times	No	Not sure	Yes	Some-times	No	Not sure	Yes	Some-times	No	Not sure	Yes	Some-times	No	Not sure	Yes	Some-times	No	Not sure
Would lift-bus service be convenient for:																				
Work/school trips?	46%	18%	25%	11%	55%	30%	14%	11%	53%	24%	24%	-	50%	(19)	22%	8%	47%	22%	22%	9%
	(13)	(5)	(7)	(3)	(25)	(14)	(11)	(6)	(9)	(4)	(4)		(18)	(7)	(8)	(3)	(65)	(30)	(30)	(12)
Shopping trips?	38%	21%	35%	7%	39%	23%	29%	10%	50%	17%	28%	6%	62%	22%	14%	2%	48%	22%	24%	6%
	(11)	(6)	(10)	(2)	(20)	(12)	(15)	(5)	(9)	(3)	(5)	(1)	(36)	(13)	(8)	(1)	(76)	(34)	(38)	(9)
Medical trips?	24%	17%	41%	17%	33%	28%	32%	7%	39%	22%	33%	6%	59%	19%	20%	2%	42%	22%	29%	7%
	(7)	(5)	(12)	(5)	(18)	(15)	(17)	(4)	(7)	(4)	(6)	(1)	(35)	(11)	(12)	(1)	(67)	(35)	(47)	(11)
Other trips?	39%	25%	21%	14%	38%	38%	18%	6%	39%	28%	11%	22%	65%	27%	6%	2%	48%	30%	14%	8%
	(11)	(7)	(6)	(4)	(39)	(19)	(9)	(3)	(7)	(5)	(2)	(4)	(32)	(13)	(3)	(1)	(69)	(44)	(20)	(12)

TABLE IIC-1

QC1: What are the main reasons you have never tried the lift bus service?

Reason	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Convenience					
Does not go to destination	37% (11)	28% (15)	24% (4)	29% (17)	30% (47)
Schedule not convenient	43% (13)	26% (14)	18% (3)	29% (17)	30% (47)
Bus stop not convenient to home	30% (9)	3% (16)	30% (5)	17% (10)	25% (40)
Transfer takes too long	30% (9)	13% (7)	12% (2)	16% (2)	17% (27)
Physical Problems					
Cannot leave home without help	20% (6)	26% (14)	6% (1)	5% (3)	15% (24)
Physically unable to get to stop	37% (11)	21% (11)	6% (1)	9% (5)	18% (28)
Transfer is physically difficult	23% (7)	15% (8)	30% (5)	14% (8)	18% (28)
Do not travel	-	-	6% (1)	2% (1)	1% (2)
Fear					
Fear of difficulty getting into or maneuvering in vehicle	17% (5)	9% (5)	18% (3)	14% (8)	13% (21)
Fear of traffic	7% (2)	6% (3)	6% (1)	2% (1)	4% (7)
Fear of embarrassment	-	2% (1)	6% (1)	5% (3)	3% (5)

TABLE IIC-1 (continued)

Reason	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Preference for other modes					
Have car	47% (14)	38% (20)	71% (12)	22% (13)	37% (59)
Do not like crowds	3% (1)	6% (3)	6% (1)	5% (3)	5% (8)
Prefer wheelchair van service	7% (2)	2% (1)	-	5% (3)	4% (6)
Prefer human service agency transportation	7% (2)	4% (2)	6% (1)	17% (10)	9% (15)
Prefer taxis	7% (2)	8% (4)	-	7% (4)	6% (10)
Can get rides when necessary	30% (9)	40% (21)	12% (2)	19% (11)	27% (43)
Not aware of service	17% (5)	8% (4)	12% (2)	45% (26)	23% (37)
TOTAL RESPONDENTS	30	53	17	58	158
Responses per individual	3.8	2.9	2.9	2.7	2.9

TABLE IIC-2

QC2: Do you think you are physically able to use the lift-equipped Metrobus?

	Wheelchair-non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Yes	72% (21)	80% (45)	88% (15)	95% (56)	85% (137)
No	10% (3)	5% (3)	-	2% (1)	4% (7)
Not sure	17% (5)	14% (8)	12% (2)	3% (2)	11% (17)

TABLE IIC-3

QC3: Would you need personal assistance from an escort ...

	Wheelchair non-users		Non-wheelchair users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
To travel by lift-equipped Metrobus?	28% (7)	28% (14)	19% (3)	16% (9)	21% (33)
To travel by Metrorail?	46% (12)	30% (14)	29% (5)	18% (10)	28% (41)
To travel by taxi?	50% (14)	37% (16)	17% (3)	13% (7)	27% (40)

TABLE IIF-1

QF1: Do other people live in your household?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
No, live alone	19% (6)	23% (13)	17% (3)	58% (34)	34% (56)
Yes, family	71% (22)	74% (42)	67% (12)	37% (22)	59% (98)
Yes, others	10% (3)	4% (2)	17% (3)	5% (3)	7% (11)

TABLE IIF-2A

QF2A: Which employment category best describes you?

	Wheelchair non-users				Non-wheelchair non-users who would use the lift					
	Round 1		Round 2		Round 1		Round 2		TOTAL	
Full-time worker	36%	(9)	20%	(10)	50%	(8)	11%	(6)	22%	(33)
Part-time worker	8%	(2)	4%	(2)	-		6%	(3)	5%	(7)
Home-based employee	-		6%	(3)	-		2%	(1)	3%	(4)
Unemployed, looking for work	-		6%	(3)	6%	(1)	2%	(1)	3%	(5)
Full-time rehabilitation	-		12%	(6)	6%	(1)	4%	(2)	6%	(9)
Sheltered employment	-		2%	(1)	-		2%	(1)	1%	(2)
Student	8%	(2)	26%	(13)	6%		9%	(7)	15%	(23)
Homemaker	4%	(1)	4%	(2)	6%	(1)	-		3%	(4)
Retired	20%	(5)	4%	(2)	6%	(1)	62%	(34)	28%	(42)
Unemployed and on disability/public assistance/social security	24%	(6)	14%	(7)	19%	(3)	4%	(2)	12%	(18)
Other	-		4%	(2)	-		-		1%	(2)

TABLE IIF-2B

QF2B: If unemployed, does lift-bus service increase your chances of getting a job?

	Wheelchair non-users				Non-wheelchair non-users who would use the lift					
	Round 1		Round 2		Round 1		Round 2		TOTAL	
Yes	36%	(4)	60%	(15)	-		47	(7)	48%	(26)
No, transportation is not the major problem	27%	(3)	36%	(9)	100%	(3)	47%	(7)	41%	(22)
No, lift-bus service does not meet my transportation needs.	36%	(4)	4%	(1)	-		7%	(1)	11%	(6)

TABLE IIF-3

QF3: What is your age?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
Age	Round 1	Round 2	Round 1	Round 2	TOTAL
10-14	-	2% (1)	-	2% (1)	1% (2)
15-19	-	20% (11)	-	8% (5)	10% (16)
20-24	13% (4)	11% (6)	11% (2)	-	7% (12)
25-34	33% (10)	27% (15)	33% (6)	2% (1)	20% (32)
35-44	10% (3)	16% (9)	22% (4)	2% (1)	10% (17)
45-54	17% (5)	14% (8)	22% (4)	15% (9)	16% (26)
55-59	7% (2)	5% (3)	-	8% (5)	6% (10)
60-64	10% (3)	4% (2)	-	13% (8)	8% (13)
65 and over	10% (3)	2% (1)	11% (2)	50% (30)	22% (36)

TABLE IIF-4

QF4: Are you . . .?

	Wheelchair non-users		Non-wheelchair non-users who would use the lift		
	Round 1	Round 2	Round 1	Round 2	TOTAL
Male	42% (13)	48% (27)	50% (9)	37% (22)	43% (71)
Female	58% (18)	52% (29)	50% (9)	63% (38)	57% (94)

TABLE IIF-5

QF5: What is your gross annual household income?

	Wheelchair non-users				Non-wheelchair non-users who would use the lift					
Income	Round 1		Round 2		Round 1		Round 2		TOTAL	
Under $5,000	11%	(2)	36%	(13)	9%	(1)	35%	(17)	29%	(33)
$ 5,000-$ 9,999	11%	(2)	8%	(3)	-		38%	(18)	20%	(23)
$10,000-$14,999	11%	(2)	14%	(5)	36%	(4)	8%	(4)	13%	(15)
$15,000-$19,999	11%	(2)	6%	(2)	9%	(1)	4%	(2)	6%	(7)
$20,000-$24,999	16%	(3)	6%	(2)	-		4%	(2)	6%	(7)
$25,000-$29,999	5%	(1)	3%	(1)	-		6%	(3)	4%	(5)
$30,000 or over	37%	(7)	28%	(10)	46%	(5)	4%	(2)	21%	(24)

TABLE IIF-6

QF6: Where do you reside?

	Wheelchair non-users				Non-wheelchair non-users who would use the lift				TOTAL	
	Round 1		Round 2		Round 1		Round 2			
N.E. D.C.	30%	(1)	8%	(5)	-		12%	(7)	8%	(13)
S.E. D.C.	7%	(2)	5%	(3)	11%	(2)	2%	(1)	5%	(8)
N.W. D.C.	16%	(5)	12%	(7)	11%	(2)	14%	(8)	13%	(22)
S.W. D.C.	7%	(2)	-		-		2%	(1)	2%	(3)
Fairfax County, Virginia	13%	(4)	32%	(18)	11%	(2)	26%	(15)	24%	(39)
Arlington County, Virginia	7%	(2)	7%	(4)	6%	(1)	9%	(5)	7%	(12)
Alexandria, Virgina	3%	(1)	5%	(3)	-		2%	(1)	3%	(5)
Prince George's County, Maryland	13%	(4)	5%	(3)	6%	(1)	-		5%	(8)
Montgomery County, Maryland	32%	(10)	21%	(12)	50%	(9)	35%	(20)	31%	(51)
Other	-		4%	(2)	6%	(1)	-		2%	(3)

APPENDIX C: RESULTS OF THE ON-BOARD SURVEY OF ABLE-BODIED RIDERS

Washington Metropolitan Area Transit Authority

ON-BOARD SURVEY

ROUTE: ALL

TIME: (5-7) ALL (8-10)

This survey is being conducted by the Washington Metropolitan Area Transit Authority (WMATA). As you may know, WMATA has specially equipped some of its Metrobuses with lifts at the front door so that wheelchair users and other passengers who have difficulty climbing stairs can use Metrobus service. The results of this and other surveys will be used to evaluate how successful the lift-equipped buses are in providing transportation to disabled residents of the Washington area.

Please help us improve transportation for everyone by taking a few minutes to complete this survey. Then simply fold the survey as indicated, staple it shut and drop it in a mailbox, no postage needed. Your cooperation is very much appreciated.

1. Were you aware that some Metrobuses on this route are equipped with lift devices to permit wheelchair users and other disabled people to travel by bus?

No. of Respondents

92% ☐ (1) Yes 8% ☐ (2) No 212

If Yes, how did you learn about the lift? See Attached

Fold here

2. Have you seen the lift in operation (for a passenger) while riding the bus?

16% ☐ (1) Once
14% ☐ (2) 2-5 times
7% ☐ (3) 6-10 times
31% ☐ (4) More than 10 times
32% ☐ (5) Never--(Skip to Question 4)

212

3.a. Do you feel that use of the lift by other passengers has caused you any inconvenience or significant delay?

15% ☐ (1) Yes, a great deal
30% ☐ (2) Yes, somewhat
52% ☐ (3) No -- (Skip to Question 4)
2% ☐ (4) Not sure -- (Skip to Question 4)

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PLEASE TURN TO THE NEXT PAGE

If you answered Yes to Question 3a:

b. How much have you been delayed on the average due to a lift boarding? 66

3% ☐ (1)	less than one minute	29% ☐ (4)	5-10 minutes
11% ☐ (2)	1-3 minutes	27% ☐ (5)	over 10 minutes
29% ☐ (3)	3-5 minutes	2% ☐ (6)	Don't remember

c. What is the most you have ever been delayed due to a lift boarding? 64

0 ☐ (1)	less than one minute	19% ☐ (4)	5-10 minutes
6% ☐ (2)	1-3 minutes	11% ☐ (5)	10-15 minutes
16% ☐ (3)	3-5 minutes	45% ☐ (6)	over 15 minutes
		3% ☐ (7)	Don't remember

d. As a result, do you avoid travelling on those Metrobuses which are designated as lift-equipped? 67

12% ☐ (1)	Yes	6% ☐ (3)	Not sure
82% ☐ (2)	No		

4. Are you willing to give up your seat to a wheelchair user? 211

92% ☐ (1)	Yes	1% ☐ (3)	Not sure
7% ☐ (2)	No		

5. How many one-way trips do you usually make on Metrobuses each week (Count going and returning as two trips)

median=10 one-way trips (If none, please mark a zero) 212

6. How many of these trips each week are for work or school?

median=10 one-way trips (If none, please mark a zero) 188

7. How far did you have to walk to board this bus?

median-1 blocks (If less than one block, please mark a zero) 194

8. How far are you willing to walk to a bus stop?

median=3 blocks (If less than one block, please mark a zero) 206

THE FOLLOWING QUESTIONS ARE NECESSARY FOR STATISTICAL PURPOSES. YOUR ANSWERS WILL MAKE THIS SURVEY MORE USEFUL.

9. What is your age? 215

0 ☐ (1)	Under 14	15% ☐ (6)	45-54
5% ☐ (2)	15-19	9% ☐ (7)	55-59
14% ☐ (3)	20-24	7% ☐ (8)	60-64
25% ☐ (4)	25-34	8% ☐ (9)	65 and over
18% ☐ (5)	35-44		

10. Are you or is any other member of your family mobility-impaired? 214

2% ☐ (1) I am _____ (Specify impairment)

3% ☐ (2) Other family member is _____ (Specify impairment)

95% ☐ (3) No

11. Are you . . . ? 213

58% ☐ (1) Female 42% ☐ (2) Male

12. How many autos are owned and operated by your household? 213

38% ☐ (1)	One	15% ☐ (3)	Three or more
21% ☐ (2)	Two	27% ☐ (4)	None

13. Do you have a driver's license? 215

80.5% ☐ (1) Yes 19.5% ☐ (2) No

14. Where do you live? 215

10% ☐ (1)	NW D.C.	3% ☐ (7)	Arlington Co.
8% ☐ (2)	SW D.C.	9% ☐ (8)	Alexandria
5% ☐ (3)	NE D.C.	1% ☐ (9)	Fairfax City
2% ☐ (4)	SE D.C.	7% ☐ (10)	Fairfax Co.
24% ☐ (5)	Montgomery Co.	3% ☐ (11)	Other
28% ☐ (6)	Prince Georges Co.		

15. What is your household's annual income (before taxes)? 202

7% ☐ (1)	Under $5,000	13% ☐ (5)	$30,000-$39,999
8% ☐ (2)	$5,000-$9,999	17% ☐ (6)	$40,000-$49,999
21% ☐ (3)	$10,000-$19,999	16% ☐ (7)	$50,000 or over
18% ☐ (4)	$20,000-$29,999		

PLEASE TURN TO THE NEXT PAGE

We welcome any other comments you may have about the lift-equipped bus service.

Thank you! Your time and assistance is most appreciated.

Comments: About half provided comments -

-45% expressed approval

-11% disapproval

-Very few suggested that the disabled be served by an alternative system

LIFT ON-BOARD SURVEYS ON LIFT BUSES 08/04/81

FILE DCONBD (CREATION DATE = 08/04/81) WMATA ON-BOARD SURVEY

Q1A INFO SOURCE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
RADIO	1.	1	0.5	0.6	0.6
TV	2.	8	4.1	5.1	5.7
NEWSPAPER,MAGAZINE	3.	18	9.2	11.4	17.1
WORD OF MOUTH	4.	4	2.1	2.5	19.6
SAW LIFT IN SERVICE	5.	53	27.2	33.5	53.2
SAW LIFT IN DEMO	6.	2	1.0	1.3	54.4
SAW SYMBOL ON BUS	7.	30	15.4	19.0	73.4
OTHER	8.	42	21.5	26.6	100.0
	-1.	37	19.0	MISSING	100.0
	TOTAL	195	100.0	100.0	

VALID CASES 158 MISSING CASES 37

APPENDIX D: RESULTS OF THE SURVEYS OF LIFT AND NON-LIFT BUS DRIVERS

Division ALL (5-9)

Washington Metropolitan Area Transit Authority

LIFT BUS DRIVER SURVEY

1. Why did you choose an accessible route in the last driver pick?

No. of Respondents: 106

11% (1) Wanted to help the disabled

25% (2) Route easier or more convenient time

26% (3) Had no choice but accessible routes

38% (4) Other _____ (specify)

2. Would you choose an accessible route at the next pick?

107

21% (1) Yes, I would prefer it to a similar non-accessible route

18% (2) No, I would prefer a similar non-accessible route

62% (3) Doesn't matter if accessible or not

3. How long have you been a Metrobus driver? 104

median ~7 Years _____ Months

4. Have you experienced difficulty operating the lift (either in service or at the garage)? 105

14% (1) Never experienced any difficulties (Skip to Question 6)

48% (2) A few times

4% (3) 25% of the time

10% (4) 50% of the time

5% (5) 75% of the time

7% (6) Almost every time

13% (7) Never operated the lift (Skip to Question 18)

PLEASE CONTINUE ON THE NEXT PAGE

5. What is the most frequent problem you have experienced with the lift? (Please choose one answer.) 81

15% (1) Fails to move from the stowed position

22% (2) Fails to lower/rise

12% (3) Safety gate fails to operate properly

0 (4) Fails to stop when touches ground

9% (5) Fails to stow properly

7% (6) Drifts out of stowed position

21% (7) Safety interlock malfunctions; bus cannot be moved

4% (8) Controls are confusing

10% (9) Other _____ (specify)

6. Do you feel the lift equipment is basically reliable? 100

35% (1) Yes

37% (2) No

28% (3) Not sure

7. Please estimate the number of times you have operated the lift for passengers since the lifts were installed on the WMATA buses? 58

9.7 **times** (excluding those who never operated the lift)

(If never, please mark a zero and skip to Question 15.)

8. Have you had to leave your seat to assist lift users getting on/off the lift? 75

48% (1) No

39% (2) Yes, a few times

1% (3) Yes, 25% of the time

3% (4) Yes, 50% of the time

4% (5) Yes, 75% of the time

5% (6) Almost every time

9. Have you had to leave your seat to assist lift users to secure them into their seat position?

77

49%(1) No

39%(2) Yes, a few times

0(3) Yes, 25% of the time

0(4) Yes, 50% of the time

3%(5) Yes, 75% of the time

9%(6) Almost every time

10. Has this assistance generally been at the user's request or your own initiative?

56

a. Getting on/off the lift

30%(1) User's requests

43%(2) Own initiative

27%(3) Both

b. Securing passengers in position:

39

21%(1) User's requests

41%(2) Own initiative

39%(3) Both

11. How have non-handicapped riders responded to the use of the lift? (Please choose all that apply.)

71

28%(1) No reaction

23%(2) Curiosity

34%(3) Favorably

10%(4) Offered assistance

27%(5) Some impatience

9%(6) Negative comments

3%(7) Ridicule

12. If you observed unfavorable reactions above, how have lift users handled such reactions? (Please choose all that apply.)

59

9%(1) Embarrassed

27%(2) Apologetic

12%(3) With angry response

63%(4) No reaction

13. How valuable was the handicap awareness training you received?

76

65%(1) Very valuable

33%(2) Somewhat valuable

1%(3) Not valuable

1%(4) Did not receive training

PLEASE CONTINUE ON THE NEXT PAGE

14. How valuable was the lift operation training you received? 81

67% (1)	Very valuable	2% (3)	Not valuable
30% (2)	Somewhat valuable	1% (4)	Did not receive training

15. Do you feel you need refresher training? 98

20% (1)	Yes, in lift operation	11% (3)	Yes, in both
5% (2)	Yes, in handicap awareness	63% (4)	No

16. What problems arose during operation that were not covered in the training session?

_____

_____

17. Have problems with the lift equipment affected the overall service reliability? 95

23% (1)	Considerably	16% (3)	No
36% (2)	Only slightly	25% (4)	Not sure

18. Do you think WMATA's image has changed as a result of the lift bus project? (Please indicate how.) 104

36% (1)	Improved	32% (3)	Remained the same
8% (2)	Deteriorated	25% (4)	Don't know

19. Do you support the lift bus project effort to serve the handicapped? 107

80% (1)	Yes	10% (3)	Not sure
9% (2)	No		

Other Comments:

_____

_____

_____

_____

_____

Thank you!

Division ALL (5-9)

Washington Metropolitan Area Transit Authority

NON-LIFT BUS DRIVER SURVEY

1. Why did you not choose an accessible (lift-equipped) route in the last driver pick?

No. of Respondents

23%(1) I preferred not to be involved in the lift bus project — 127

15%(2) I wanted to remain with my previous route and schedule

6%(3) Did not have enough information about the lift bus program.

46%(4) I chose the best pick without regard to whether it was an accessible route.

4%(5) I had an accessible route on a previous pick and desired not to choose one again.

9%(6) I am a relatively new operator and had little choice in the last pick.

2. Would you choose an accessible route at the next pick? — 127

3%(1) Yes, I would prefer it to a similar non-accessible route

29%(2) No, I would prefer a non-accessible route

68%(3) Does not matter if accessible or not

3. How long have you been a Metrobus driver?

median ~6 Years _____ Months — 122

4. Have you ever operated the lift on one of WMATA's lift-equipped buses? — 131

54%(1) Yes (in service) 10%(3) No -- (Skip to Question 7)

36%(2) Yes (in garage only)

PLEASE CONTINUE ON THE NEXT PAGE

5. Have you experienced difficulty operating the lift (either in service or at the garage)? 114

17% (1) Never experienced any difficulties (Skip to Question 7)

56% (2) A few times

4% (3) 25% of the time

10% (4) 50% of the time

4% (5) 75% of the time

10% (6) Almost every time

6. What is the most frequent problem you have experienced with the lift? (Please choose <u>one</u> answer.) 105

18% (1) Fails to move from the stowed position

24% (2) Fails to lower/rise

10% (3) Safety gate fails to operate properly

2% (4) Fails to stop when touches ground

4% (5) Fails to stow properly

4% (6) Drifts out of stowed position

22% (7) Safety interlock malfunctions; bus cannot be moved

10% (8) Controls are confusing

8% (9) Other _____ (specify)

7. Do you feel the lift equipment is basically reliable? 130

29% (1) Yes

45% (2) No

25% (3) Not Sure

8. Do you think problems with the lift equipment affect overall service reliability? 130

35% (1) Considerably

31% (2) Only slightly

21% (3) No

14% (4) Not sure

9. Do you think WMATA's image has changed as a result of the lift bus project? (Please indicate how.) 130

30% (1) Improved

18% (2) Deteriorated

25% (3) Remained the same

28% (4) Don't know

10. How often do you think a lift bus driver has to operate the lift for passengers?

N.A. times per day (If none, please mark a zero. If don't know, mark an X.)

11. Do you support the lift bus project effort to serve the handicapped?

74% (1) Yes

22% (2) No

4% (3) Not sure

Other Comments:

Thank you!

APPENDIX E

REPORT OF NEW TECHNOLOGY

A thorough review of the work performed under this contract has revealed no significant innovations, discoveries, or inventions at this time. In addition, all methodologies employed are available in the open literature. However, the findings in this document do represent new information and should prove useful throughout the United States in designing and evaluating future transportation demonstrations.

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